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**INFORMAL REPORT**

FINAL REPORT

DISMANTLEMENT OF BUILDING 666 AND INDUSTRIAL  
WASTEWATER TREATMENT PLANT NO. 4

Donald L. Smith

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*Paul G. Brunner*

PAUL G. BRUNNER  
Deputy Director  
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FINAL REPORT  
DISMANTLEMENT OF BUILDING 666 AND INDUSTRIAL  
WASTEWATER TREATMENT PLANT NO. 4

Donald L. Smith

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## ABSTRACT

Building 666 and Industrial Wastewater Treatment Plant No. 4, located at McClellan Air Force Base, were dismantled and disposed of as hazardous waste in accordance with applicable state and federal regulations. The facility (which was shut down in 1980) was contaminated, principally with heavy metals, and was in a deteriorated condition.

This report describes work performed to dismantle the facility down to ground level and stabilize the facility floors, trenches, pits, and sumps to minimize contamination spread until future remedial actions are performed on the below-ground portions of the facility.



## SUMMARY

This report describes the dismantlement of Building 666 and Industrial Wastewater Treatment Plant No. 4 (IWTP No. 4) at McClellan AFB near Sacramento, California. Building 666 was an electroplating shop (189 x 199 ft) and the IWTP was the waste treatment plant dedicated to the electroplating operations. Building 666 and IWTP No. 4 were contaminated principally with heavy metals.

Objectives of the dismantlement project were to remove above-ground portions of the facility and thereby prepare the facility for a Remedial Investigation and Feasibility Study (RI/FS) of the below-ground portions of this facility, prevent future hazardous contamination spread caused by deterioration of the facility, and stabilize the facility floors, trenches, pits, and sumps to minimize contamination spread until remedial actions on the below-ground portions of this facility are performed in the future. All the objectives were accomplished.

The dismantlement operations began in October 1986 and were completed on March 25, 1988. An interruption in the operations occurred between November 1986 and July 1987 to resolve regulatory concerns, and to modify and renegotiate the contract to reflect a change in the disposal site from California to Utah.

Bierlein Industrial Services performed the dismantlement at a contract price of \$2.7 million. Some of the work was subcontracted to International Technology, Inc. In addition to the \$2.7 million, the Air Force paid the Department of Energy/Idaho National Engineering Laboratory (INEL) \$256K for: preparing the SOW, evaluating proposals, on-site inspection services, project photography, perimeter air monitoring for the project's duration, structural analysis as required by EM, and preparing and publishing the Final Report.

The waste volume generated and disposed at off-base hazardous waste disposal sites consisted of 2800 tons of solid waste and 6980 gallons of liquid waste. In addition to waste disposed off-base, 161,900 gallons of liquid met the acceptance criteria of the McClellan AFB Industrial Wastewater Collection System (IWCS) and was disposed of on-base in the IWCS. The acceptance criteria required that no restricted hazardous waste (as defined by Title 22, California Administrative Code, Section 66900) be discharged into the IWCS. Of an estimated 300 tons of structural steel from Building 666, 236 tons were successfully decontaminated and recycled.

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FINAL REPORT  
DISMANTLEMENT OF BUILDING 666 AND INDUSTRIAL  
WASTEWATER TREATMENT PLANT NO. 4

INTRODUCTION AND BACKGROUND

This report describes the tasks performed to dismantle Building 666, Industrial Wastewater Treatment Plant No. 4, and associated facilities at McClellan Air Force Base (AFB). This report also presents the condition of the site after dismantlement and identifies the cost and duration of the project, and hazardous waste volume generated.

Building 666 and Industrial Wastewater Treatment Plant No. 4 (IWTP No. 4) are located in Area B of McClellan AFB, north of Sacramento, California. This facility was built in 1957 and used until 1980 as an electroplating facility. Later, the facility was chemically characterized,<sup>1, 2</sup> and the USAF decided to dismantle the facility. Dismantlement, a removal action as defined by Section 101 (23) of the Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), was considered to be a necessary preparatory action to the Remedial Investigation and Feasibility Study (RI/FS) to fully characterize and evaluate final remedial actions for the below-ground portions of this facility. The RI/FS of the below-ground portion of Building 666 and IWTP No. 4 is included as part of a base-wide RI/FS that was initiated in October 1987.

Planning for the dismantlement of Building 666 and IWTP No. 4 began in April, 1986. A Statement of Work<sup>3</sup> was published in June, 1986, and a contract to dismantle the facility was awarded in October 1986 to Bierlein Industrial Services, Inc. of Lansing, Michigan.

## FACILITY DESCRIPTION BEFORE DISMANTLEMENT

Building 666 (Site 47) and Industrial Wastewater Treatment Plant No. 4 (IWTP No. 4) (Site 48) are located in Area B of McClellan AFB, north of Sacramento, California. Figure 1 gives the general location of McClellan AFB in California, and Figure 2 shows the location of Area B and Building 666 on McClellan AFB. The entire facility consisted of Building 666, IWTP No. 4, the Sandblast Facility, and Building 645B. Figure 3 shows the relative locations of Building 666, IWTP No. 4, the Sandblast Facility, and Building 645B before dismantlement. This section describes the physical characteristics and chemical hazards of the facility before the start of this project.

### Physical Description

#### Building 666 (Site 47)

Building 666 was located in the southwest corner of McClellan AFB. The building was used as the Base's electroplating facility from 1957 until 1980. From 1980 to 1982, it was used as a hazardous waste storage facility. The building remained vacant from 1982 until it was dismantled in 1987/88.

Building 666 was a 189-ft, 4-in. (E-W) by 199-ft, 3-in. (N-S) by 22-ft, 11-in.-high steel and concrete structure. The building had a steel frame enclosed by three rows of precast concrete wall panels and steel-framed window units. A view of the south side of Building 666 is shown in Figure 4. The roof consisted of precast concrete panels covered by built-up roofing. The building floor, which was not removed, consists of a hardened concrete slab containing many trenches, pits, and sumps. Each corner of the building, except the southwest corner, contained a heating, ventilating and air conditioning (HVAC) structure. These HVAC "towers" were 20 ft wide in the E-W direction and 33 ft, 3 in. high (approximately 10 ft above the roof level). The HVAC tower widths in the

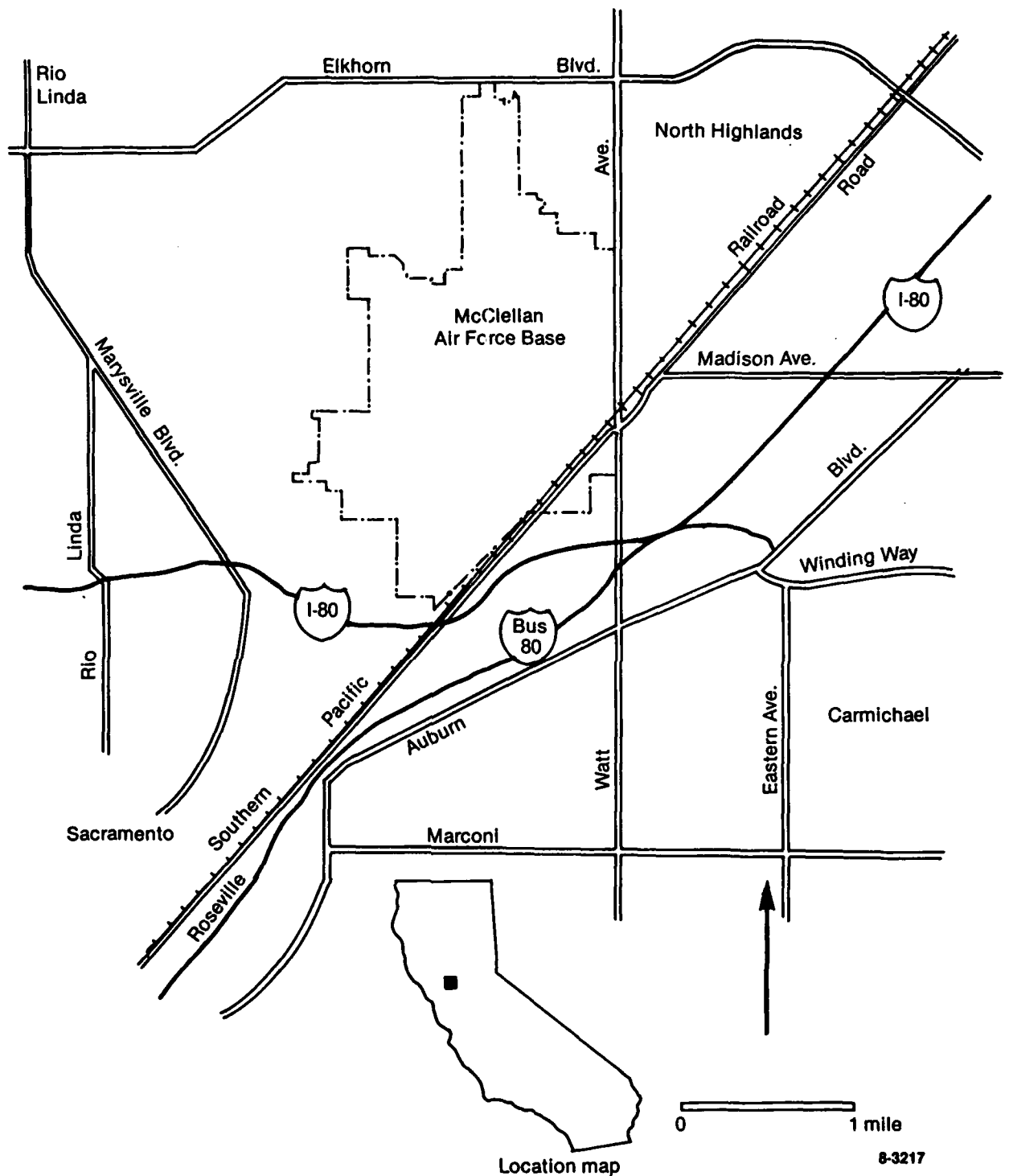


Figure 1. McClellan AFB location map.

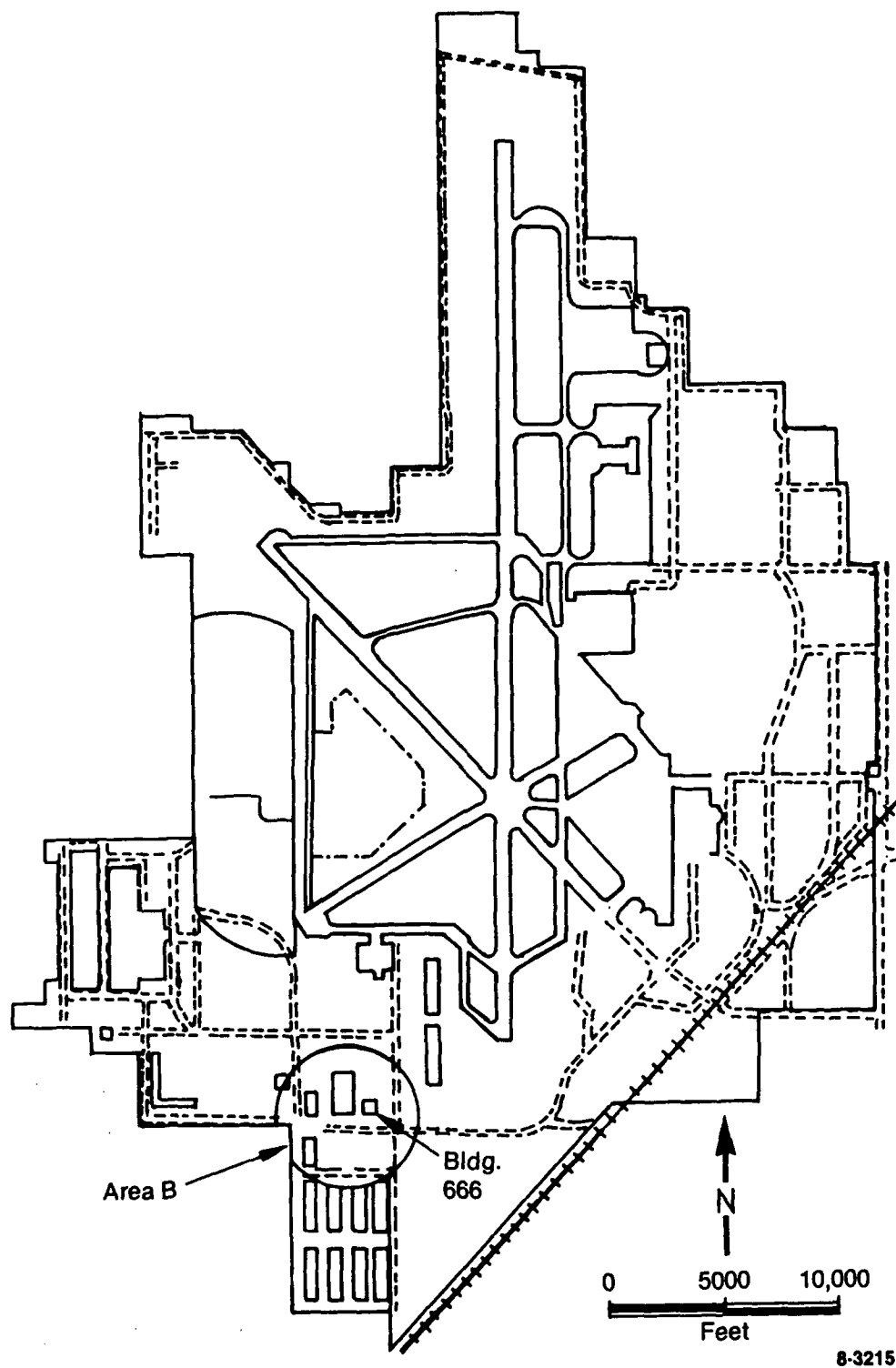


Figure 2. McClellan AFB map showing the location of Area B.

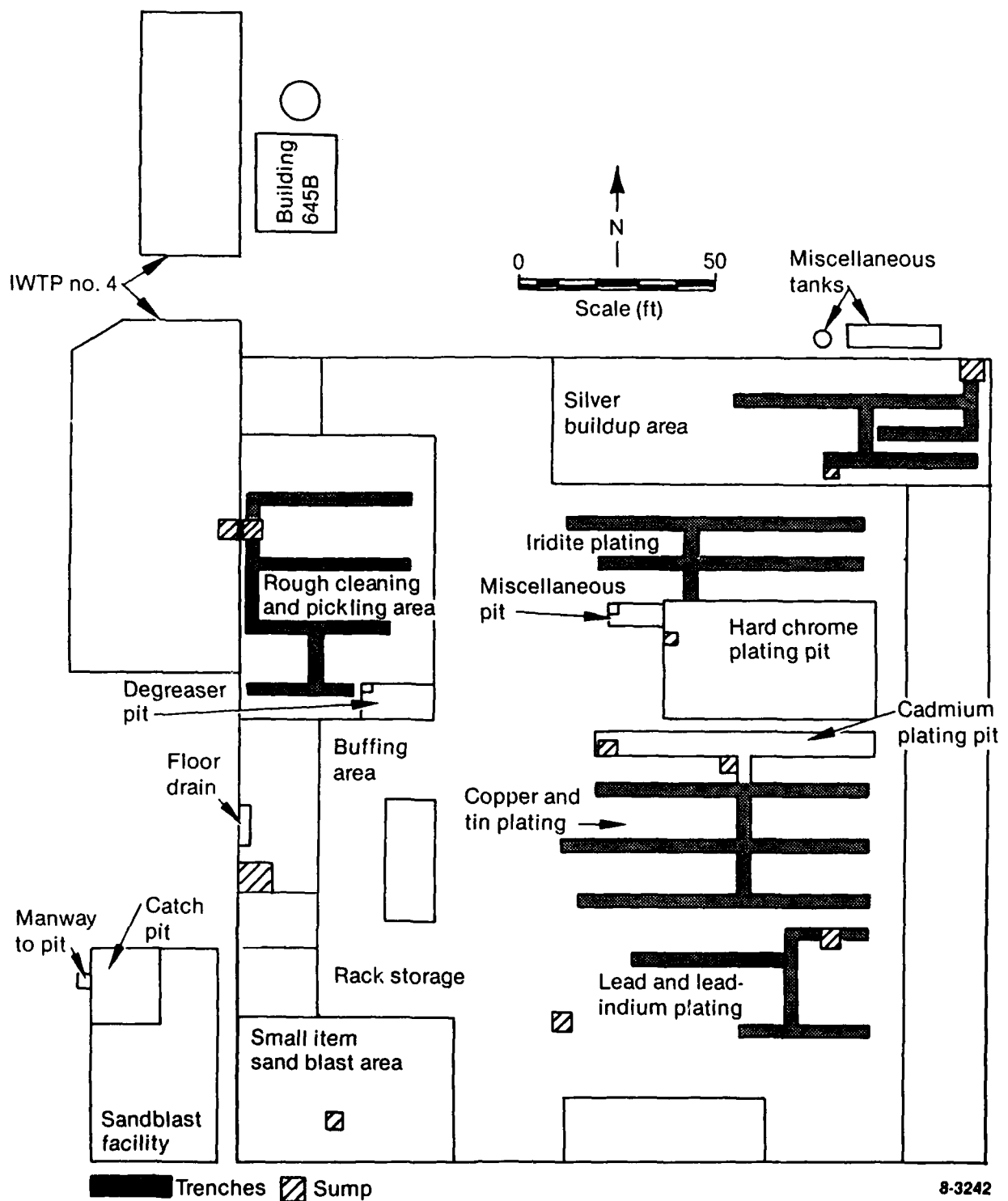


Figure 3. Plan view of Building 666 and IWTP No. 4 before dismantlement, including location of trenches, sumps, and pits.

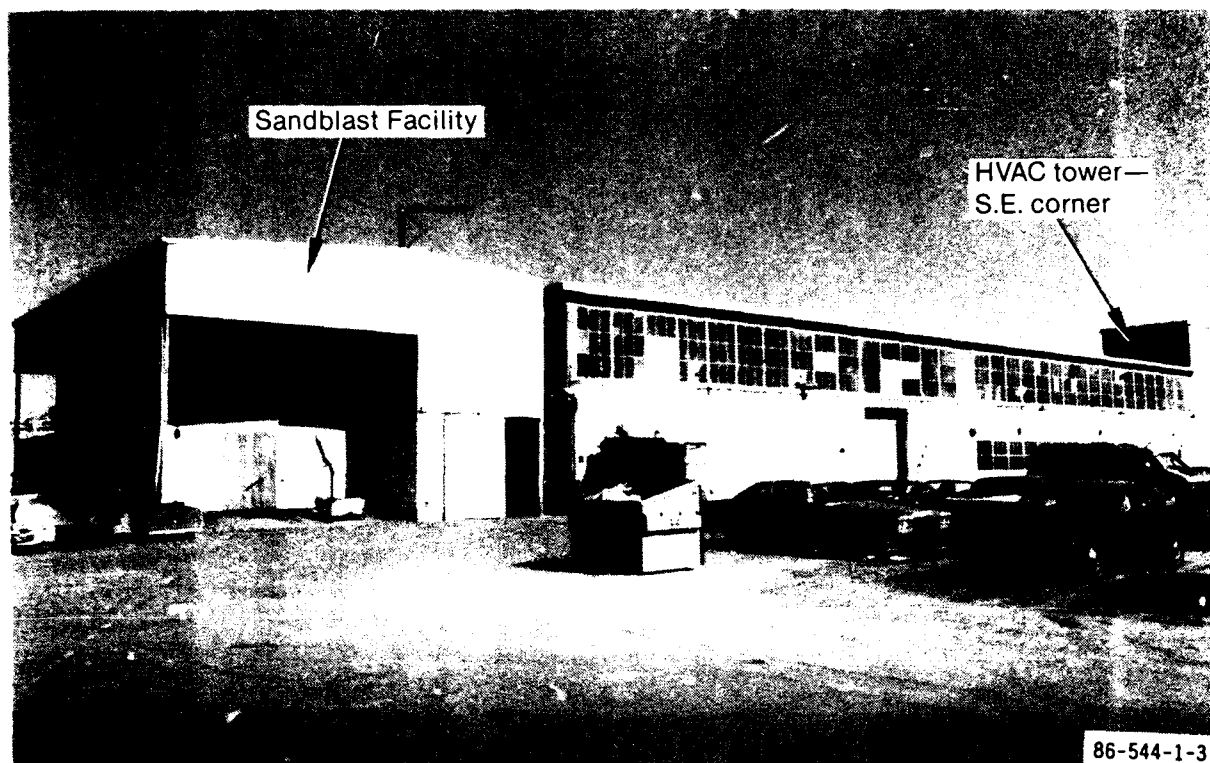
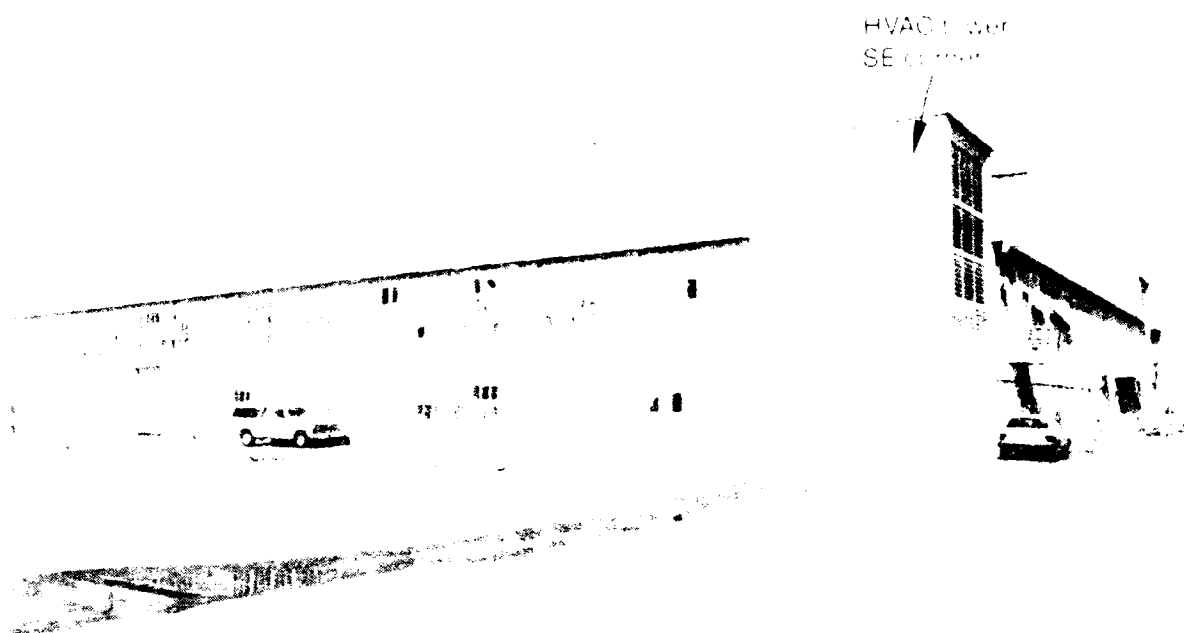


Figure 4. Building 666 south side with Sandblast Facility at left.

N-S direction were 16 ft, 9 in. in the southeast corner of building, 17 ft, 4 in. in the northeast corner of building, and 23 ft, 9 in. in the northwest corner of building. The southeast corner HVAC tower is shown in Figure 5.

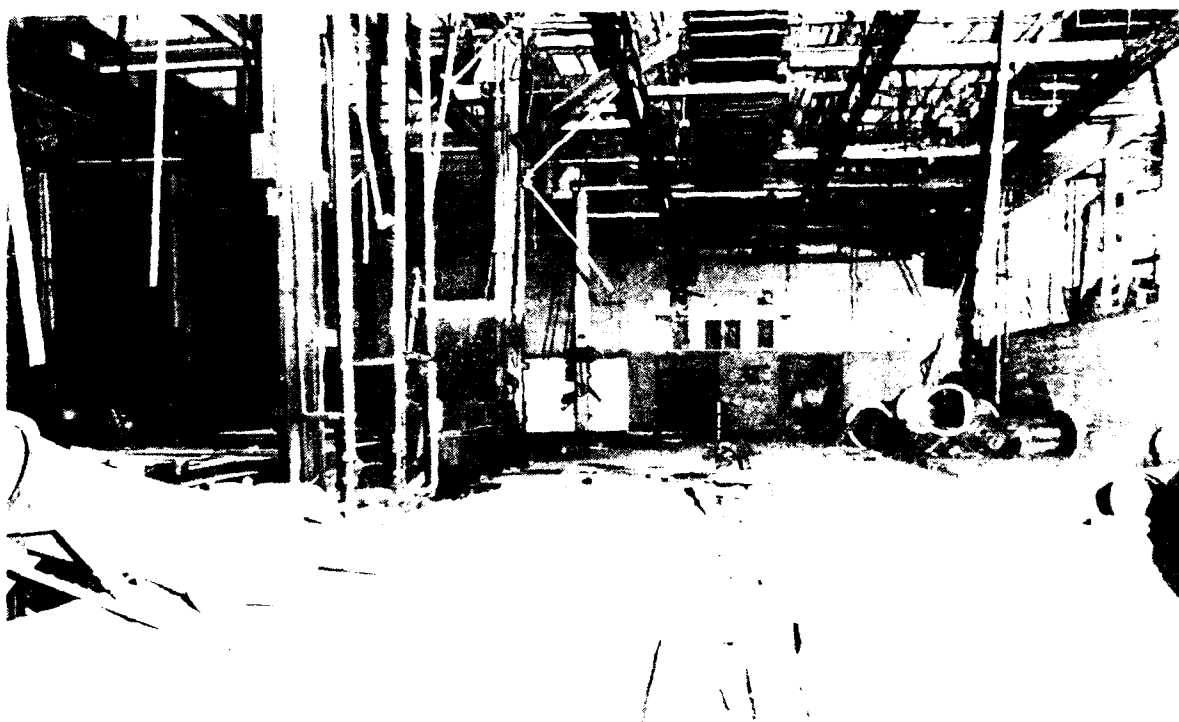
In 1982, the rooftop-mounted ventilation units were removed along with the built-up roofing material. The ventilation roof penetrations were then sealed with sheetmetal caps and the roof recovered with built-up roofing materials. During this roofing modification, the toxic exhaust ductwork was cut loose from the roofing vents and allowed to drop to the building floor (Figures 6 through 10).

The Air Force was responsible for isolating the building before the dismantlement project began. Water, gas, and compressed air supply piping were isolated from the building by cutting the lines outside the building and capping the end of the piping. The steam supply line was initially isolated at the boiler plant. Later, the underground steam line was cut west of Building 666. The electrical feeders were also physically isolated at the building substation. Inadvertently, one 440 volt electrical line



86-544-1-1

Figure 5. Building 6-E viewed from southeast.



86-251-4-4

Figure 6. Building 6-E interior, inside of large area of floor work.





Figure 7. Building 666 interior, rough cleaning and pickling area looking northeast.

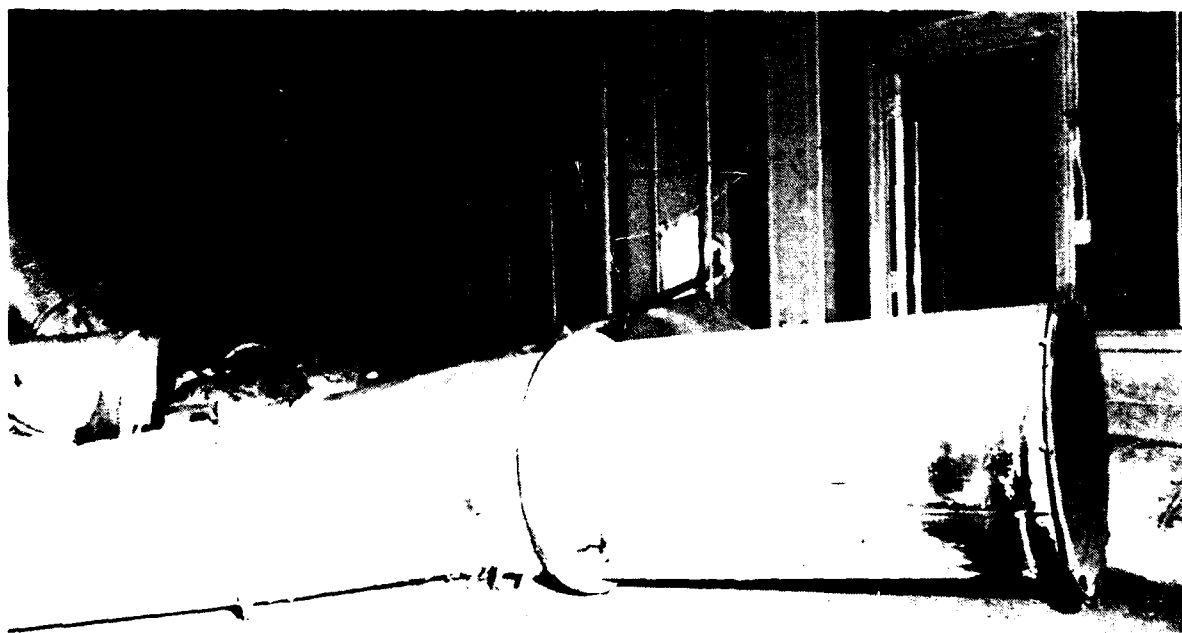


Figure 8. Building 666 interior looking north.



86-251-6-7

Figure 9. Building 666 interior, gold and silver plating area looking west.



86-251-1-3

Figure 10. Building 666 interior, ducting at south end of building.

was left energized. In addition, a 3-in. water line in the IWTP No. 4 was left pressurized. These were encountered during dismantlement and will be discussed later.

The pits (except the degreaser and miscellaneous pit in Figure 3), trenches, and some adjacent floor areas were lined with acid-proof mortar and bricks. These bricks were removed during ripout of the building interior.

The building contained approximately 300 empty 55-gal drums that had been used to contain drilling cuttings not associated with this facility.

#### Sandblast Facility

The Sandblast Facility, a metal frame facility with corrugated steel walls and roofing, was approximately 32 ft wide (E-W) by 54 ft long (N-S) by 23 ft high (Figure 4). This building consisted of two bays running the length of the building in the N-S direction. The bay immediately adjacent to Building 666, approximately 10 ft wide, housed hoppers and other sandblasting equipment (Figures 11 and 12). The west bay, approximately 22 ft wide, contained two sandblasting booths connected by swinging doors. These booths were located over catch pits with galvanized hoppers to collect the used sandblasting beads. Above the booths was a ventilation space, approximately 4 ft. high, that housed the exhaust fans and filters for the booths.

The Sandblast Facility, which was used to support the electroplating shop, became inactive in 1980 when electroplating operations stopped.

#### Miscellaneous Tanks

Two carbon steel tanks were located outside the north wall of Building 666 near the northeast corner of the building (Figure 13). The horizontal tank was nearest to the building corner and was mounted on four column supports that were approximately 14 ft high. This empty tank was about 6 ft in diameter and 20 ft long. A pipe led from the tank under the



86-251-1-1

Figure 11. East bay of Sandblast Facility interior looking north.



86-251-1-2

Figure 12. East bay of Sandblast Facility interior looking south.



Figure 13. North side of Building 666.

roadway and emerged from the ground approximately 25 ft north of the building corner next to a pair of abandoned equipment supports. This tank was a recent addition and was not tied into Building 666.

Immediately west of the horizontal tank was an empty, vertically mounted air storage tank, about 4 ft in diameter and 15 ft high. Piping from this tank led into the silver buildup area of Building 666 (see Figure 3).

#### IWTP No. 4 (Site 48)

IWTP No. 4 was used to treat wastes from the electroplating operations in Building 666 before discharging wastes into the Industrial Wastewater Collection System. Located west and north of Building 666, IWTP No. 4 had two sections. The largest section (Figure 14), which contained 30 tanks, was located along the west wall of Building 666. This south section was in a fenced area approximately 60 ft wide by 102 ft long. The north section of IWTP No. 4 consisted of a fenced area, approximately 28 ft wide (E-W) by 72 ft long (N-S), and contained four open-topped tanks as shown in

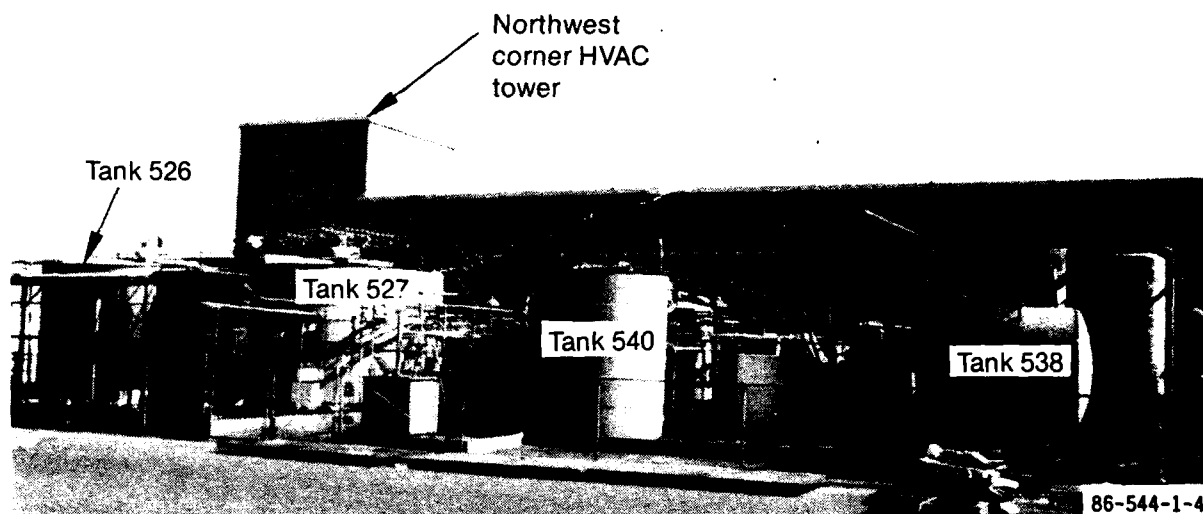


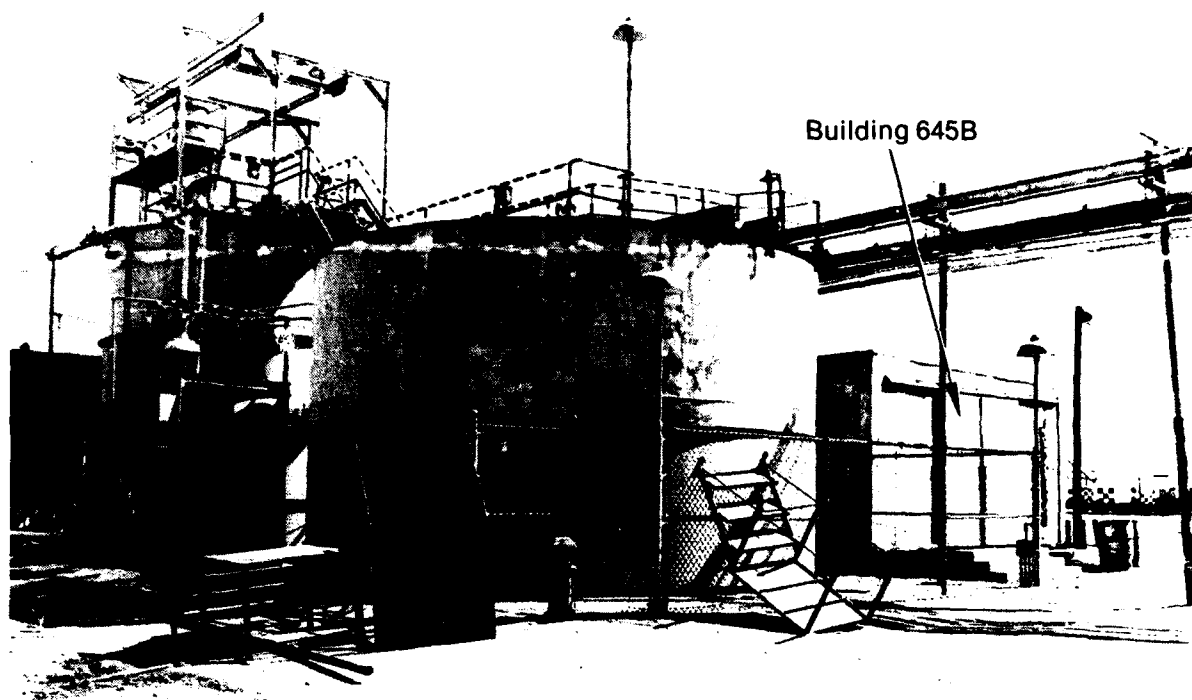
Figure 14. South section of IWTP No. 4 with Building 666 in background.

Figure 15. Another tank and Building 645B were located east of the fenced tanks. Building 645B, shown in Figure 16, which was part of the waste treatment system, was most recently used to store insulation materials.

The IWTP No. 4 tank arrangement with tank numbers is shown in Figure 17, and the tanks are described in Table 1.

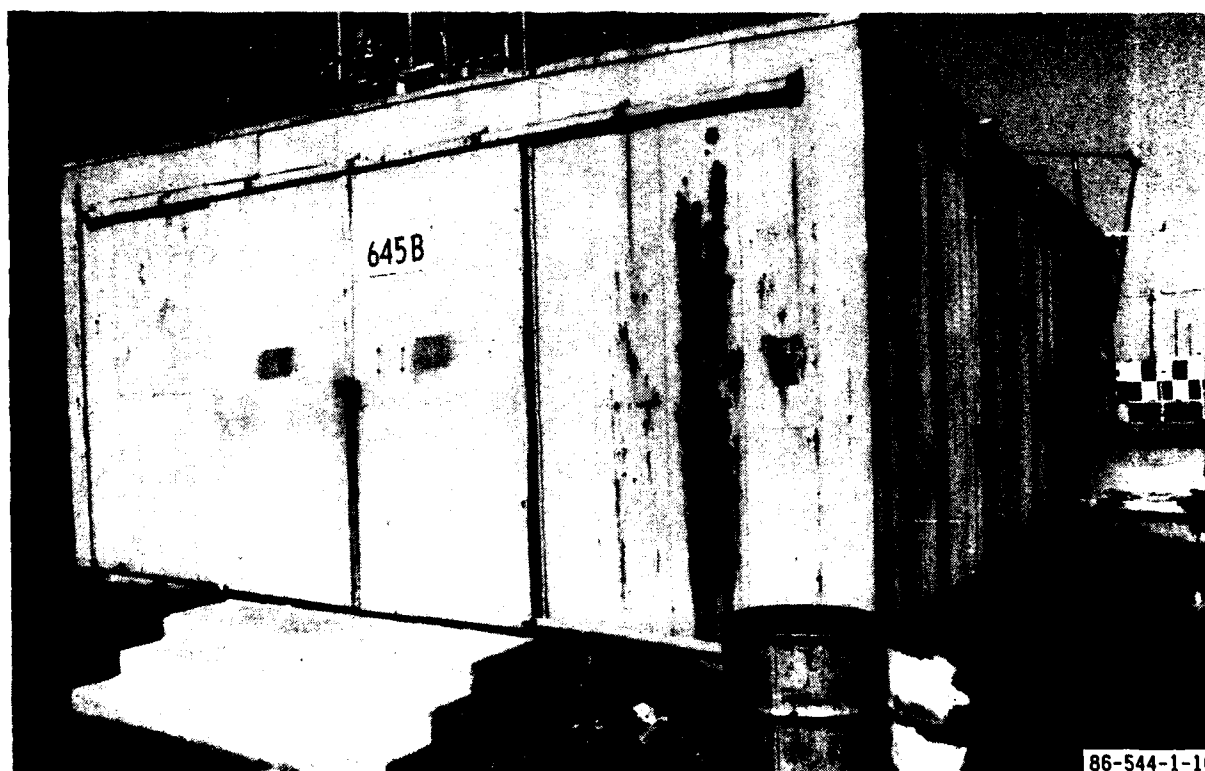
Most of the tanks were carbon steel with painted exteriors and appeared to be in good condition. Exceptions were tanks 541, 526, and 527. Tank 541, a dilute chromic acid tank, appeared to have been painted with dark gray paint, which was peeling and flaking extensively. The vinyl liners in tanks 526 and 527, treated cyanide wastes retention tanks, were coming loose from the tank interiors. The liner in Tank 526 had pulled away from the north half of the tank wall and had torn and collapsed inside the tank. No tank leakage was visible.

Also included in IWTP No. 4 was an open-topped dumpster, about half full of sludge, located north of the Sandblast Facility and about 20 ft south of the air receivers.



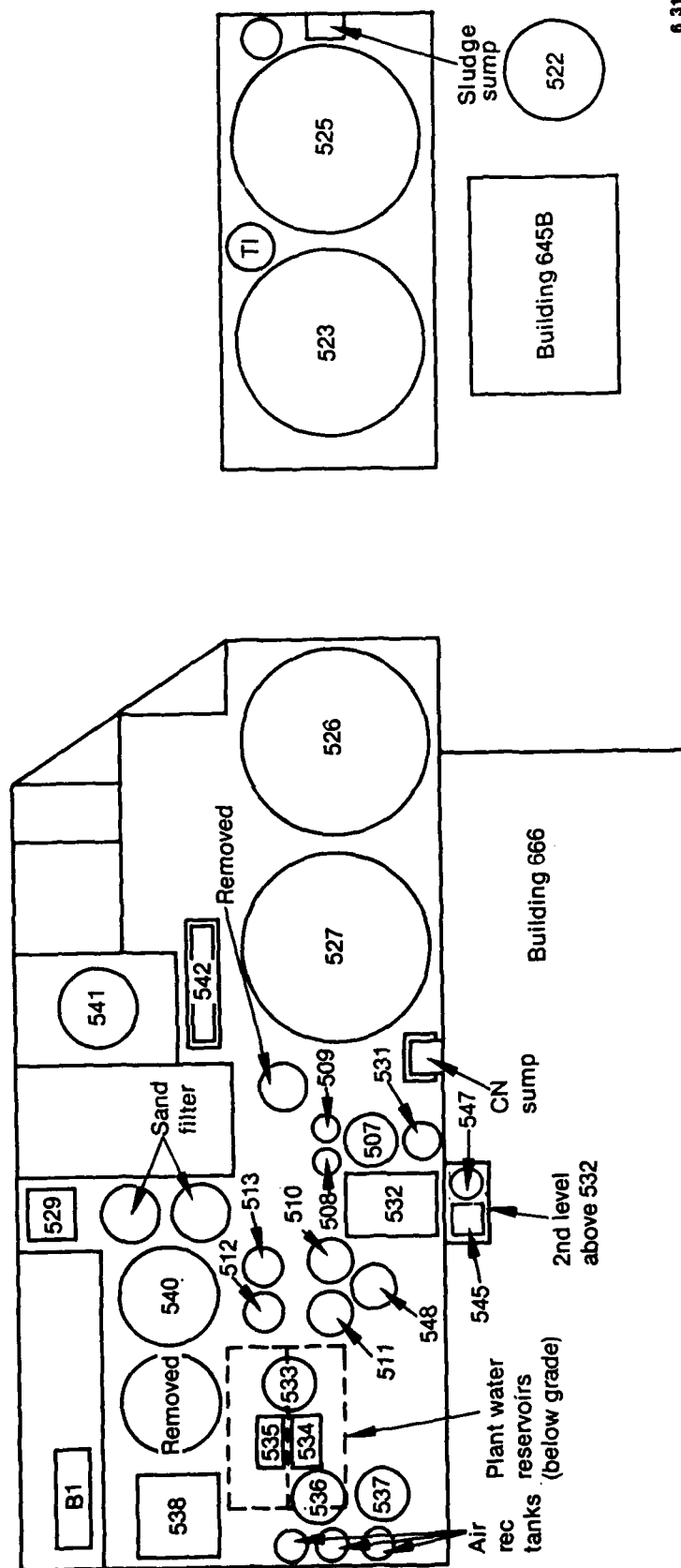
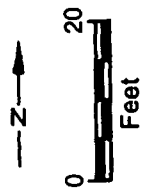
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Figure 15. IWTP No. 4 north section.



86-544-1-10

Figure 16. Building 645B, south end. The fence at left is the east side of IWTP No. 4's north section.



6 3136

Figure 17. IWTP No. 4 layout showing location of tanks and sumps.



TABLE 1. DESCRIPTION OF TANKS AND SAMPLE ANALYTICAL RESULTS AT IWTP NO. 4  
(refer to Figure 4 for tank locations)

Tank No.	Description/Contents	Approximate Dimensions			Open	Closed	Empty	Sampled	Analyses		Analytical Results of Selected Metals (mg/L unless noted)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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a. mg/kg (solid waste total digestion).

Source: After Walker (Ref. 1)

Building 645B was also considered part of IWTP No. 4. Building 645B was a skid-mounted steel building, approximately 20 ft wide (E-W) by 30 ft long (N-S) by 10 ft high. Wooden skids under the building were deteriorating because of exposure to chemicals and weather. Several drums and bins along the east wall of Building 645B contained liquid which was disposed of as hazardous waste during this project.

### Chemical Hazards

Planning for this project relied entirely on previous analyses conducted by others for Sites 47 and 48 (see References 1 and 2). The dismantlement contractor performed additional analyses after dismantlement started to satisfy disposal site requirements. The results of these analyses are presented later in this report. The chemical hazards, as known before dismantlement started, in each of the three major areas (Building 666, Sandblasting Facility, and IWTP No. 4) are described below. Table 2 summarizes the total and soluble threshold limit concentration (TTLC and STLC, respectively) limits for hazardous and extremely hazardous wastes found in Building 666.

### Building 666

All building materials and contents not specifically analyzed for chemical contamination and/or content were considered to contain hazardous substances. An example of material which had not been analyzed but was considered hazardous was the pile of dry sludge in the hard chrome pit shown in Figure 18. This assumption was based on existing analytical results, visual observations of the building, and the nature of past operations.

Generally, the building ductwork, pits, trenches, and concrete were contaminated with cadmium, chromium, silver, nickel, copper, fluorine, cyanide, chlorine, sulfates, phosphates, nitrates, and asbestos in widely varying concentrations, depending on location and proximity to processes. The contamination on the structural steel did not necessarily follow the

TABLE 2. THRESHOLD LIMIT CONCENTRATIONS FOR INORGANIC PERSISTENT AND BIOACCUMULATIVE TOXIC SUBSTANCES

Substance	STLC (mg/L)	TTLC Wet Weight (mg/kg)
Hazardous		
Asbestos	--	1.0 (as percent)
Cadmium	1.0	100
Chromium (VI) compounds	5	500
Chromium and/or chromium III compounds	560	2,500
Copper and/or copper compounds	25	2500
Fluoride salts	180	18,000
Nickel and/or nickel compounds	20	2,000
Silver and/or silver compounds	5	500
Lead and/or lead compounds	5	1,000
Extremely Hazardous		
Cadmium and/or cadmium compounds	--	10,000 (as Cd)
Lead compounds, organic	--	1,300 (dry weight basis; as Pb)

Source: California State Administrative Code, Title 22, Division 4, Environmental Health, Paragraph 66699 and 66723.



TABLE 3. BUILDING 666 SAMPLES WITH CONCENTRATIONS<sup>a</sup> OF SUBSTANCES IN EXCESS OF THE HAZARDOUS WASTE TTLCs

(The number in parentheses following the element listed at the top of each column is the TTLC for that element in mg/kg)

<u>Sample</u>	<u>Cd(100)</u>	<u>Cr(2,500)</u>	<u>Ni(2,000)</u>	<u>Cu(2,500)</u>	<u>F(18,000)</u>
Brick					
2B-1	X(184)	--	--	--	--
2B-2	X(1,020)	--	--	--	--
2B-3	X(947)	--	--	--	--
Mortar					
1M-4	--	--	X(3,160)	--	--
2M-1	X(869)	--	--	--	--
2M-2	X(2,780)	--	--	--	--
2M-3	X(1,690)	--	--	--	--
3M-3	--	X(40,300)	--	--	--
Concrete					
2C-2	X(360)	--	--	--	--
2C-3	X(360)	--	--	--	--
3C-3	--	X(2,990)	--	--	--
Scraping					
1S-2	X(147)	X(4,640)	--	--	--
2S-2	--	X(15,300)	--	--	--
2S-3	X(637)	X(4,160)	X(4,110)	--	--
3S-1	--	X(25,000)	--	--	--
3S-2	--	X(19,800)	--	--	--
4S-1	X(589)	--	X(4,830)	--	--
RW-1	--	X(7,300)	--	--	--
RW-2	X(289.1)	--	X(4,710)	X(43,900)	--
RW-3	X(320.3)	--	X(6,320)	--	--
WW-1	X(301)	--	--	--	--
Wiping					
DW-1	X(146)	--	--	X(5,350)	--
DW-2	--	X(24,800)	--	--	X(29,400)
DW-3	--	X(20,700)	--	--	--
DW-5	X(272)	--	--	--	--
DW-6	--	--	X(4,360)	--	--
DW-7	X(1,240)	--	X(42,600)	X(3,910)	--

Note: Values in parentheses are concentrations in mg/kg.

a. Sample concentrations are taken from a report by Thomas J. Walker, Inc., January 1983.

TABLE 4. LOCATION OF BUILDING 666 INTERIOR SAMPLES

Sample Number	Description of Location
BB-1 BB-2 BB-3 BB-4	Blank bricks taken from top of trough; these bricks were obtained in distal corners believed to be minimally contaminated from reported information
1B-1, 1C-1 1B-2, 1M-2, 1C-2 1B-3, 1M-3, 1C-3, 1S-1	Core material over boring Corner; third row Six in. from bottom of trough; scraping from behind loose brick and mortar
1B-4, 1M-4, 1S-2 1B-5, 1M-5	Brick 6 in. from bottom; bottom scraping Top row, next to lead sheet
2B-1 2B-2, 2M-2, 2C-3 2B-3, 2M-3 2B-4, 2M-4, 2C-4 3B-1, 3M-1, 3C-1 3B-2, 3M-2, 3C-3 3B-3, 3M-4, 3C-2, 3S-1 3B-4, 3M-5, 3C-3 3B-5	Taken from sump Second row below floor; sump supports Sump supports Second row below floor Boring materials Floor of chrome pit; visually contaminated Bluish loose materials from footings Second row down From pad
4B-1, 4C-1 4B-2, 4B-3, 4M-1, 4M-2, 4C-2 4B-4, 4M-4	Corner of sump Top corner of trough Bottom of trough
2B-1, 2C-1 DW-8, DW-9, DW-10 WW-3, WW-4, WW-5	100 sq cm circle wiped with acid; separate circle wipes with base; WW-2 and 3 extremely contaminated walls; WW-5 was very clean
RW-1 RW-2 RW-3	Sill 8 ft from floor Rafter sample Rafter sample
DW-1, DW-2, DW-3 DW-4, DW-5, DW-6, DW-7 DW-8 DW-9, DW-10	Duct scraping; roof access Duct scraping; roof access Duct scraping; inside building--clean Duct scraping; inside building--very dirty

TABLE 4. (continued)

Sample Number	Description of Location
2S-1, 2M-1, 2C-1	Floor scrapings
2S-2	Floor scrapings
3S-3	--
4S-1	Floor scrapings
4S-2, 2C-1	From wall; flakes of paint
<hr/>	
BB Blank Brick	B Brick
C Concrete	S Scraping
DW Duct Wipe or Scraping	M Mortar
	WW Wall Wipe or Scraping
	RW Rafter

Source: Thomas J. Walker, January 1983

Asbestos-containing pipe insulation had previously been removed from the process piping.

#### Sandblast Facility

Because there were no known chemical analyses data for the Sandblast Facility, it was assumed that the contamination levels in this facility were similar to those of Building 666 because of the similarity of the work performed in the two facilities and because of their proximity. In addition, the residual sand in the Sandblast Facility was assumed to be contaminated with lead from paint removal operations.

#### Miscellaneous Tanks

Two tanks were located outside along the north wall of Building 666 at the northeast building corner. There was no known chemical analysis of these tanks, but the tanks were empty.

#### IWTP No. 4

IWTP No. 4 consisted of 38 tanks. Figure 19 shows the original equipment arrangement and results of analyses performed on samples taken from tanks, and Table 1 presents the tank content analysis. Twenty of the

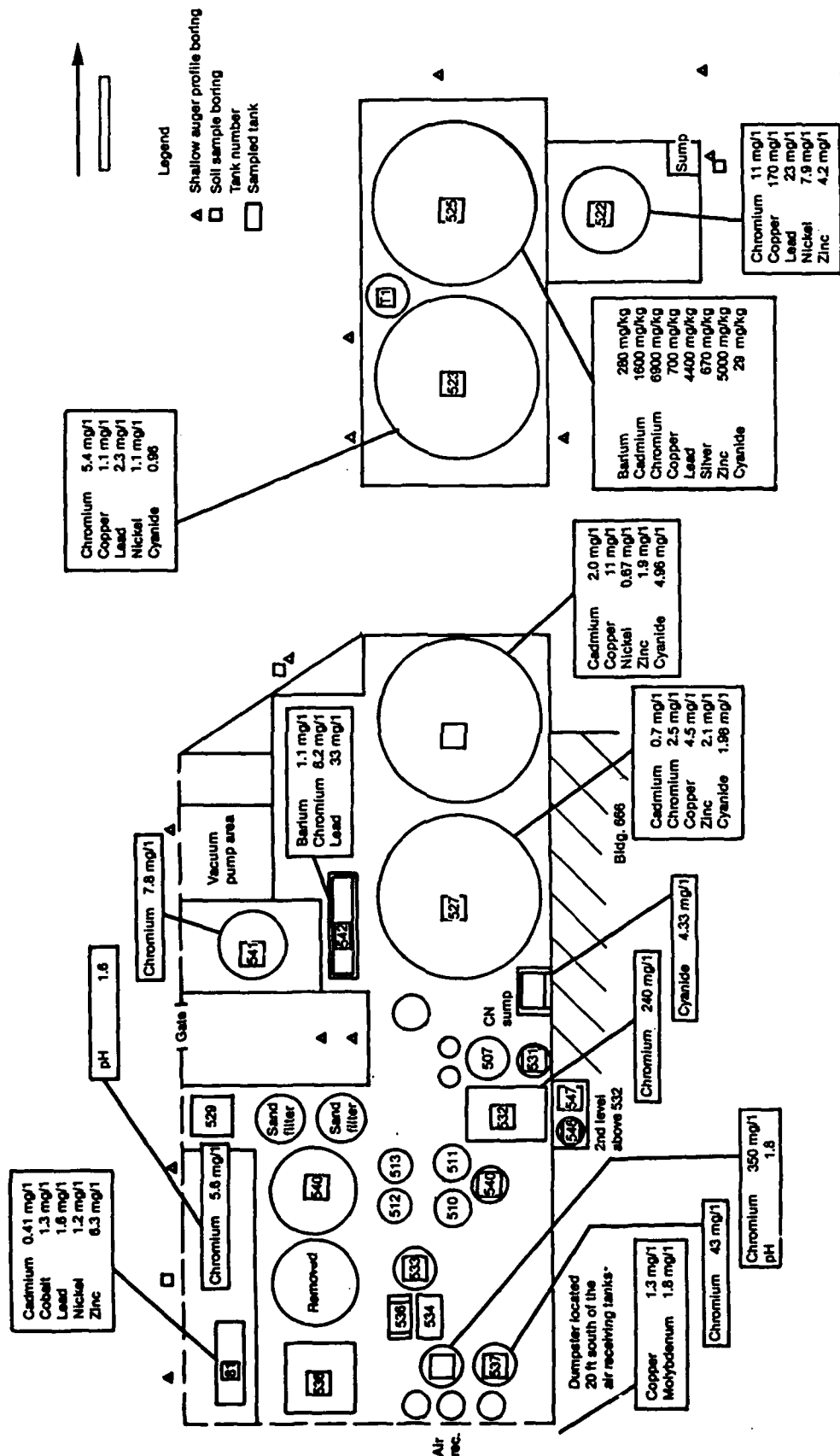


Figure 19. Location of tanks at IWTP No. 4 and summary of analyses of tanks and contents.



tanks were open and subject to dilution by precipitation and concentration by evaporation. As such, the pH and concentration values in Table 1 for those tanks were used as guidelines only.

The 38 tanks consisted of 23 process-related acid or caustic tanks, 6 ion exchangers, 3 air receivers, 2 sand filters, 1 dumpster, 1 open bin and 2 sumps. In addition, 2 plant water reservoirs, each 8 ft wide by 22 ft long by 7 ft deep, are located below grade level at the southern end of IWTP No. 4. There had been no known analysis of the liquid in these plant water reservoirs before the contract was awarded to dismantle the facility.

Also considered as part of IWTP No. 4 is Building 645B. There was no known analysis of chemical contamination of this building. It was assumed that the building interior was contaminated with a variety of hazardous materials similar to the contents of tanks 522, 523, 525, and T-1. Building 645B had been recently used to store asbestos-containing insulating materials and was assumed to contain asbestos fibers.

Because of the widespread presence of contamination throughout Building 645B and IWTP No. 4 in varying concentrations, all areas for which analysis had not been conducted was considered to be contaminated with hazardous materials.

## DISMANTLEMENT OBJECTIVES AND WORK SCOPE

### Objectives

The objectives of the Building 666 and IWTP No. 4 dismantlement project were to:

- Prevent future hazardous contamination spread caused by continuing facility deterioration.
- Remove the facility down to the concrete slab and thereby prepare the facility for performance of a Remedial Investigation and Feasibility Study (RI/FS) of the below-ground portions of this facility.
- Stabilize the facility floors, trenches, pits, and sumps to minimize contamination spread after the dismantlement project and before final remedial actions on the below-slab portion of this facility.

### Work Scope

The work scope for dismantling Building 666 and IWTP No. 4 reflects the course of action selected after evaluating the chemical condition of the facility and considering USAF and regulatory requirements. The work scope was also influenced by the precautions required during dismantlement because the facility was located very close to operating facilities at McClellan AFB. All the waste generated during this project was disposed of as hazardous waste.

The scope of work performed is summarized below.

- Prepare site and facility for dismantlement by constructing a fence around the entire site and sealing Building 666 to minimize contamination spread during ripout of the building contents. In addition, install a ventilation system in Building 666.

- Remove and dispose of sludge and liquid from trenches, sumps, pits, and tanks from inside the building and in the IWTP No. 4.
- Remove, mechanically section, and dispose of piping, tanks, and other components from the IWTP No. 4.
- Dismantle and dispose of Building 645B.
- Rip out and dispose of the contents of Building 666, including all piping, conduit, ducting, light fixtures, electrical equipment, interior walls and partitions, interior mezzanine floors, acid-proof bricks lining the trenches, sumps, and pits, and other components of equipment.
- Rip out and dispose of the contents of the Sandblast Facility.
- Dismantle the Sandblast Facility and dispose of material.
- Fill trenches in Building 666 with concrete.
- Wash down interior of Building 666, collect water in sumps, and dispose of liquid.
- Remove roof and walls of Building 666 and dispose of all material.
- Dismantle and decontaminate Building 666 structural steel.
- Construct rain-tight covers over each sump and pit and the two underground plant water reservoirs.

## WORK PERFORMED

The work performed consisted of the tasks shown in the work breakdown structure (WBS) shown in Figure 20.

### Project Planning and Management

The planning and management of this dismantlement project was performed by McClellan AFB Environmental Management (EM) with the assistance of personnel from EG&G Idaho, Inc., of the Idaho National Engineering Laboratory (INEL). The AF requested and obtained assistance from the INEL through a Military Interdepartmental Purchase Request (MIPR) to prepare the Statement of Work (SOW), evaluate proposals submitted by prospective contractors, provide project inspection services, perform project photography, monitor perimeter air, perform structural analysis, and prepare this final report. Contract Administration for the dismantlement contract was performed by the McClellan AFB Directorate of Contracting and Manufacturing.

### Prepare SOW and Issue RFP

A statement of work (SOW) was prepared by the INEL and approved by EM. The SOW specified the scope of work required to dismantle Building 666 and IWTP No. 4. In addition, it specified how the work was to be performed in order to satisfy government requirements. The SOW was written in sufficient detail to serve as the contract specification, and was made part of the request for proposal (RFP) issued by the McClellan AFB Directorate of Contracting and Manufacturing.

### Evaluate Proposals and Award Contract

Following the RFP and a prebid tour of the facility, three acceptable proposals were received and evaluated. The evaluation team consisted of three technical persons from Environmental Management, one technical person from the INEL, one cost estimator from the INEL, and the AF Contracting Officer. The three technical persons from Environmental Management

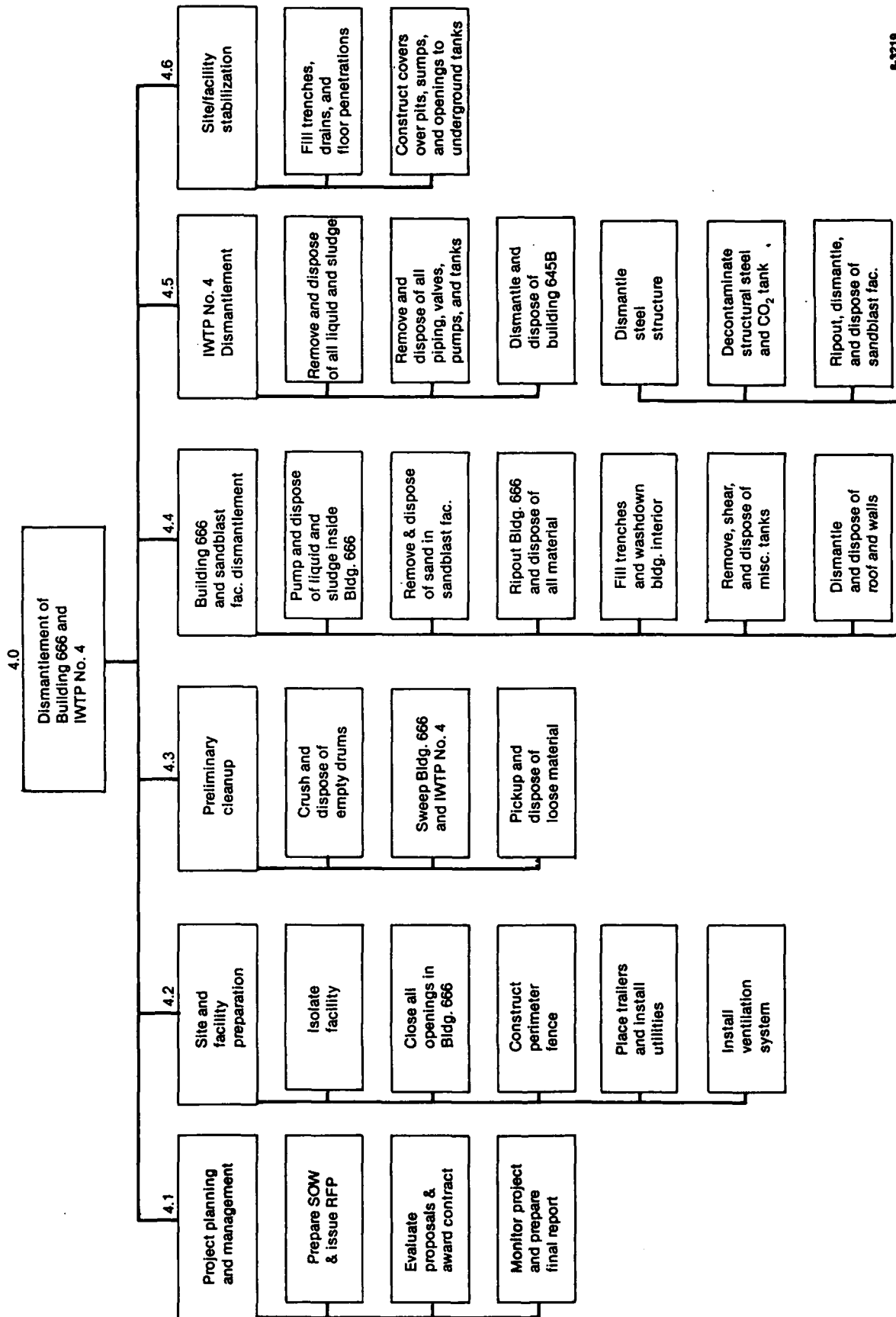


Figure 20. Work breakdown structure for dismantlement of Bldg. 666 and IWTP No. 4.

consisted of two engineers and one industrial hygienist. Both members from the INEL had been involved in the preparation of the SOW. Following the evaluation of the first proposal from each bidder, comments and questions were submitted to the Contracting Officer who included the comments and questions in a request for a "best and final" proposal from each bidder.

The best and final proposal was evaluated by the same team that evaluated the first proposal from each prospective contractor. Based on results of the final evaluation, the AF Contracting Officer awarded the contract to Bierlein Industrial Services, Inc. of Lansing, Michigan.

#### Monitor Project and Prepare Final Report

The INEL provided a technical person (site inspector) to monitor the daily dismantlement activities during the project and report daily to the McClellan AFB EM Project Manager. This INEL person had participated in the SOW preparation and had been a member of the proposal evaluation team. During the entire project, the site inspector maintained an office in the Contractor's office trailer and monitored all activities for conformance to the SOW and other specifications and procedures. In addition, he sampled air daily at four locations around the site perimeter fence to verify that no significant airborne contamination was leaving the project site. The site inspector also documented all significant activities by periodically photographing all phases of the project.

The site inspector reported the status of the project on a daily basis to the EM Project Manager. Any nonconformance to specifications was included in the daily status report and the matter was resolved by the appropriate AF personnel.

One nonconformance to specifications during Building 666 ripout resulted in structural damage to the building and required a structural analysis. This engineering service was requested by the Air Force and performed by a structural analyst from the DOE/INEL.

The site inspector had no authority to stop work, make decisions, or resolve observed nonconformances to specifications.

When the project was completed, the site inspector prepared, and the AF approved, this final report.

### Site and Facility Preparation

Before work started at Building 666 and IWTP No. 4, several actions were required to make the facility safe for subsequent dismantlement, minimize contamination spread during dismantlement, and establish temporary facilities for the contractor and workers. These actions are summarized in the following paragraphs.

#### Isolate Facility

Before dismantlement activities started, the AF disconnected lines supplying natural gas, steam, water, and electricity to Building 666 and IWTP No. 4. The natural gas line was cut and capped approximately 30 ft from the south side of Building 666. The gas line entered the building perpendicular to the wall about 64 ft from the SE corner of the building. The 1-1/2 in. line was excavated and cut, and the section leading south toward the valve was capped (see Figure 21).

The steam lines were first disconnected at the steam generator located in Building 655. Later, the two steam pipes were cut and a section was removed from each pipe. This was done in the steam pipe vault, which runs underground between Building 655 and Building 666. The location of this vault is on the west side of Building 666 approximately 73 ft from the SW corner of Building 666. The cuts on the steam pipes were made just outside the west perimeter fence constructed around the Building 666/IWTP No. 4 site.

The main water line previously supplying Building 666 was excavated, cut, and capped on the east side of Building 666 approximately 17 ft west of the NW corner of the electrical substation (Figure 22). When this pipe

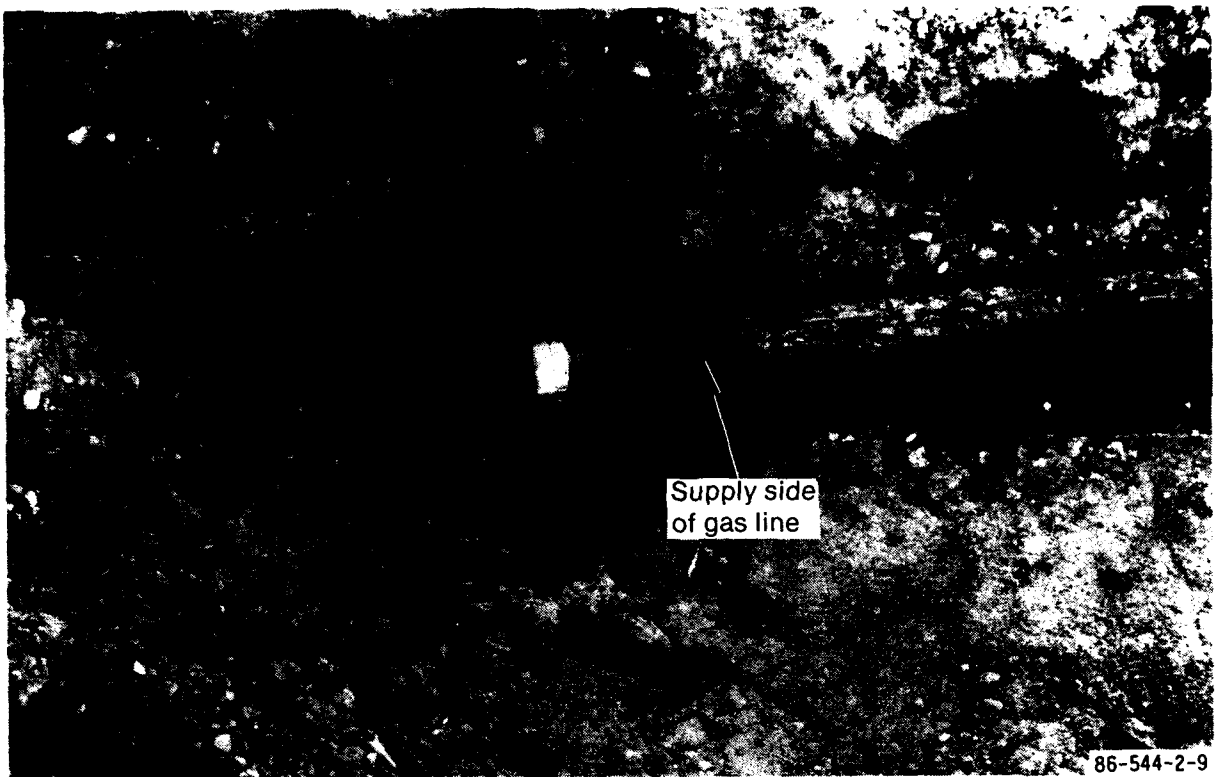


Figure 21. Natural gas line cut and capped.



Figure 22. Main water line supplying Building 666 cut and capped.



was cut and capped, it was thought to be the only pipe supplying water to the Building 666/IWTP No. 4 facility. However, another active 3-in. water supply line was discovered in the IWTP No. 4 after dismantlement of the IWTP No. 4 was started. This line was inadvertently broken during operation of heavy equipment in the IWTP No. 4. The broken line was repaired by flanging off this 3-in. pipe just above the ground. This pipe cannot be independently valved off and is still pressurized.

The facility was electrically isolated before dismantlement started by disconnecting all circuits on the secondary side of transformers supplying Building 666/IWTP No. 4 in the electrical substation just east of Building 666. After dismantlement started, an energized electrical cable was discovered during torch cutting of electrical conduit inside Building 666. The source of this live circuit was the primary side of the transformer in the substation. This 440 volt circuit originally supplied emergency lighting in Building 666 during power interruptions on the secondary side of the transformer. Complete electrical isolation was effected by physically disconnecting this 440 volt line on the the primary side of the main transformer.

#### Close All Openings in Building 666

Building 666 had broken windows, open windows, open doors, and louvers in the three HVAC towers which, if not closed, would have allowed airborne contamination to leave the building once work began inside the building. All these openings were closed before activities started inside the building (see Figures 23 and 24).

#### Construct Perimeter Fence

A perimeter fence was constructed (Figure 25) around Building 666, the IWTP No. 4, and the electrical substation to limit access to the project site during dismantlement and to restrict the use of this area until completion of the RI/FS to be performed in the future. Existing fencing was utilized, and the new fence was constructed by the contractor in



Figure 23. South side of Building 666 showing boarded-up broken windows, closed windows, and closed doors.



Figure 24. HVAC tower on southeast corner of Building 666 showing boarded-up louvers.



accordance with Federal Specifications RR-F-191. The gate widths in the new fence as well as distances from the fence to the original facility are also given in Figure 25.

#### Place Trailers and Install Utilities

The contractor placed four trailers at the project site and connected each trailer to appropriate McClellan AFB utilities. Three of the trailers were 12 x 60-ft trailers. Two of these were located outside the perimeter fence and used as office trailers for the contractor, subcontractor, and site inspector. The other 12 x 60-ft trailer was located inside the perimeter fence and used as a lunch and break trailer for the workers. All three of these trailers were equipped with restrooms, and were connected to base electricity, water, and sewer. The fourth trailer was a personnel and personal protective equipment decontamination trailer equipped with two wash basins, storage cabinets, showers, and lockers, but no restroom. This trailer was supplied by the project subcontractor, IT Corporation, and is shown in Figure 26. This trailer was located inside the perimeter fence and was connected to base electricity, water, and sewer.

#### Install Ventilation System

A ventilation system was installed to Building 666 to prevent excessive buildup of airborne contaminants during the ripout of the building contents. Because the building was kept reasonably well sealed during ripout, this ventilation system proved necessary because of airborne products generated by torch cutting and the operation of diesel engines inside the building.

The ventilation system consisted of four microtrap air movers with HEPA filters. Each unit was also equipped with a prefilter which was replaced every day; the HEPA filter on each unit was replaced periodically as required.

Each microtrap unit was rated at 1700 CFM for a total air moving capacity of 6800 CFM.

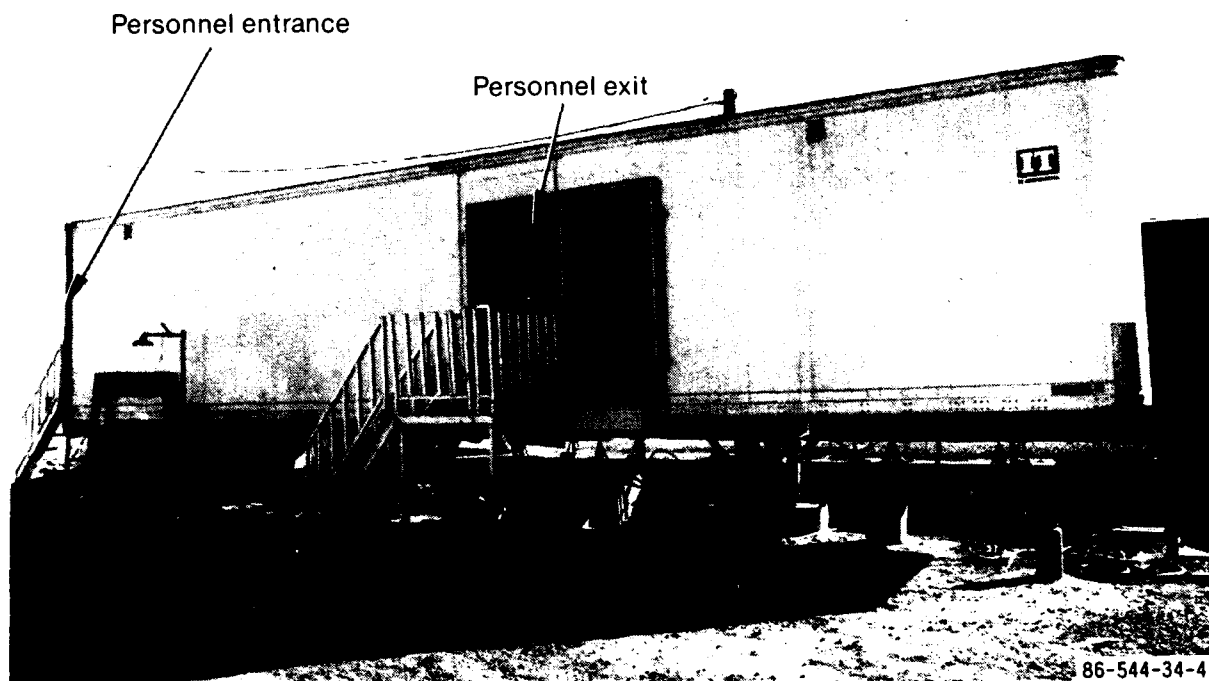


Figure 26. Personnel decontamination trailer.

#### Preliminary Cleanup

##### Crush and Dispose of Empty Drums

Approximately 300 empty 55-gal drums were left in Building 666 from another project. Disposal of these drums was made part of this project and included in the contract. The 300 drums were crushed in a drum crusher (Figure 27) and disposed of as hazardous waste.

##### Sweep Building 666 and IWTP No. 4

The floor and mezzanines of Building 666 and the floor of IWTP No. 4 were swept to remove dust that had accumulated during the past several years. Dust stirred up during sweeping was minimized by spraying areas to be swept with a water mist. The sweepings were placed in waste bins for disposal as hazardous waste.



Figure 27. Truck-mounted drum crusher. A waste bin is on the left.

#### Pick Up and Dispose of Loose Material

Loose material inside and outside the buildings consisted of wooden pallets, scrap lumber, scrap metal, cabinets, wall lockers, desks and trash. This material was picked up and placed in waste bins and disposed of as hazardous waste. Round, loose ducting that was scattered throughout the interior of Building 666 was consolidated into piles, crushed, and later disposed of with other solid waste generated during building ripout.

#### Building 666 and Sandblast Facility Dismantlement

##### Pump and Dispose of Liquid and Sludge Inside Building 666

Before building ripout started, all liquid remaining in the trenches was pumped out and stored in 55-gal drums. After ripout started, the dry sludge in the chrome pit and liquid in the sumps were removed and stored in

55-gal drums. The liquid was analyzed to determine if it could be disposed of in the McClellan AFB industrial wastewater collection system (IWCS) or had to be transported to an off-base disposal site. Disposal into the IWCS required meeting the IWCS acceptance criteria, which required that no restricted hazardous waste (as defined by Title 22, California Administrative Code, Section 66900) be discharged to the IWCS.

#### Remove and Dispose of Sand in Sandblast Facility

All the sand remaining in the Sandblast Facility was vacuumed into a vacuum truck (Figure 28), dumped onto the floor of Building 666, then front-end loaded into waste bins for disposal. Residual sand in the Sandblast Facility was found in the sand hoppers, beneath the floor of the south section of the west bay, and in steel channels used to transfer sand around the facility. Approximately 52,000 lb of contaminated sand were removed and shipped to the disposal site.



Figure 28. Super-sucker sucking sand in Sandblast Facility.

### Rip Out Building 666 and Dispose of all Material

This task consisted of removing and disposing of the contents of Building 666 while maintaining the building's integrity as an enclosure, leaving only the exterior walls and roof. The objective of this task was to remove and dispose of the contaminated contents of the building without spreading airborne contamination. The only item of equipment salvaged was the 2-ton carbon dioxide tank which McClellan AFB reused after decontamination.

Before ripout started, all piping was tapped and drained or purged with pressurized air. All liquid from piping was collected in 55-gal drums, analyzed, and disposed of in the McClellan AFB IWCS.

The building contents included piping, conduit, ducting, light fixtures, toilet fixtures, laboratory benches, interior walls, rooms and partitions, conveyor tracks, mezzanine concrete floors, electrical equipment, HVAC components, and acid-proof bricks lining trenches, pits, and sumps.

The contractor initially performed the interior ripout in accordance with the Statement of Work, which did not require the use of written procedures. However, two incidents occurred during the first week of ripout, which resulted in all subsequent project work being performed in accordance with procedures written by the contractor and approved by McClellan AFB. These incidents were: (a) considerable damage was done to structural columns during the use of the Caterpillar 235 equipped with a grapple to pull down equipment mounted on structural columns, and (b) concrete wall panels in the south wall fell outward onto the ground. This was caused by torch cutting three steel columns at the base in the building south wall on which the south mezzanine was attached and then attempting to pull the south mezzanine away from the south wall without cutting all the mezzanine floor beams attached to the wall. The result was that the south wall moved inward, causing the concrete wall panels to fall outward. The resulting hole in the south wall was covered with two layers of plastic to prevent spread of contamination during the remainder of



ripout. After this incident, grappling inside the building was discontinued to prevent further damage to the building structure. The remainder of the interior ripout and the entire project were completed with no significant problems.

The piping, conduit, ducting and other suspended components were torch cut from a manlift and dropped to the floor (Figure 29). These components were then consolidated into large piles using the Bobcat front-end loader, then later sheared for volume reduction using the Caterpillar 235 equipped with a shear (Figure 30). This sheared material was loaded into waste bins or dump trucks and shipped to a hazardous waste landfill. The bins or truck beds were covered with tarps before leaving the building interior.

Early in the ripout phase of dismantlement of Building 666, Transite panels containing asbestos were removed, placed in a separate waste bin, and transported to the disposal site. These Transite panels made up some of the interior partitions in the small-item sandblast area in the southwest corner of Building 666, the rack storage area, the rough cleaning and pickling area, the silver buildup area, and the east mezzanine.

The 7-ft high interior concrete block walls were removed by jackhammering the concrete next to the support columns to expose the rebar, torch cutting the rebar (if required) to separate the wall from the support column, and knocking over the wall section using the Bobcat (Figure 31). The wall section was then loaded into a dump truck with the front-end loader.

The floor-to-ceiling concrete block walls were removed by jackhammering the concrete from ceiling to floor in narrow sections. One narrow section at a time was fragmented and removed from ceiling to floor to avoid having the entire 20-ft-high wall fall to the floor (Figure 32). Rebar was torch cut as required to separate concrete segments from supporting columns.

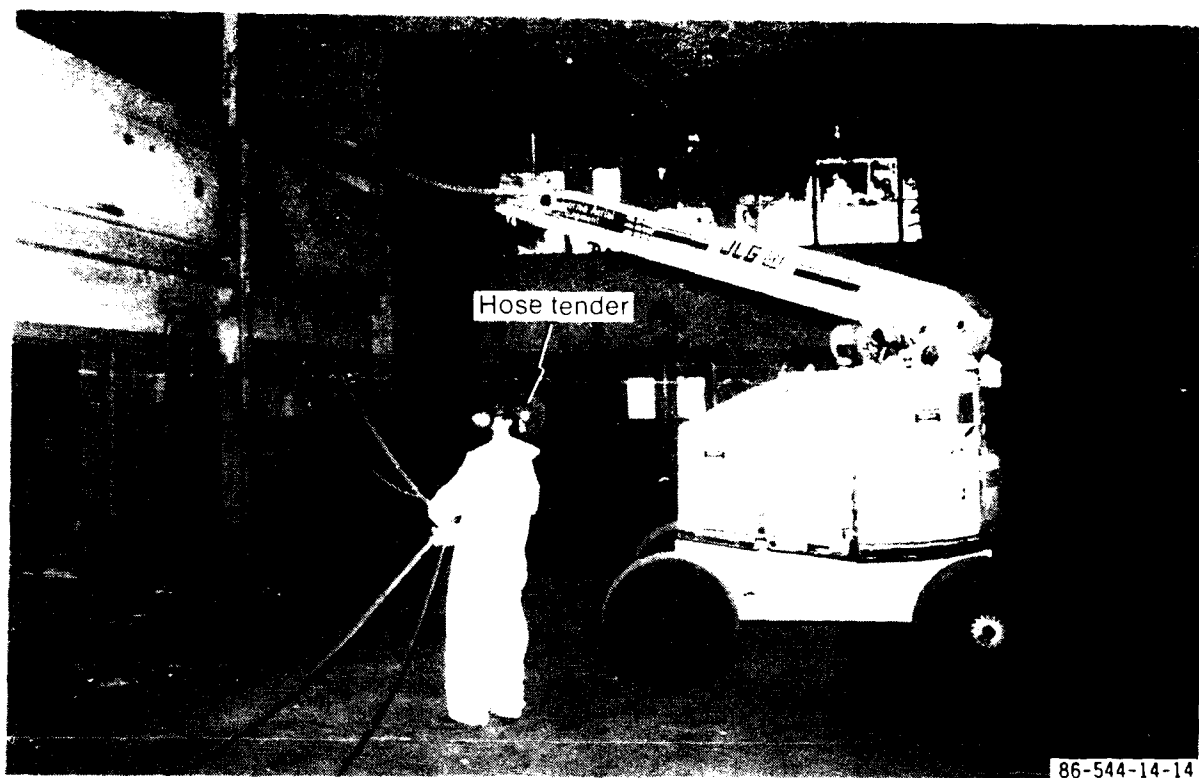


Figure 29. Torch cutting from manlift.



Figure 30. Caterpillar 235'shear shearing material inside Building 666.



Figure 31. Seven-foot interior wall removal.

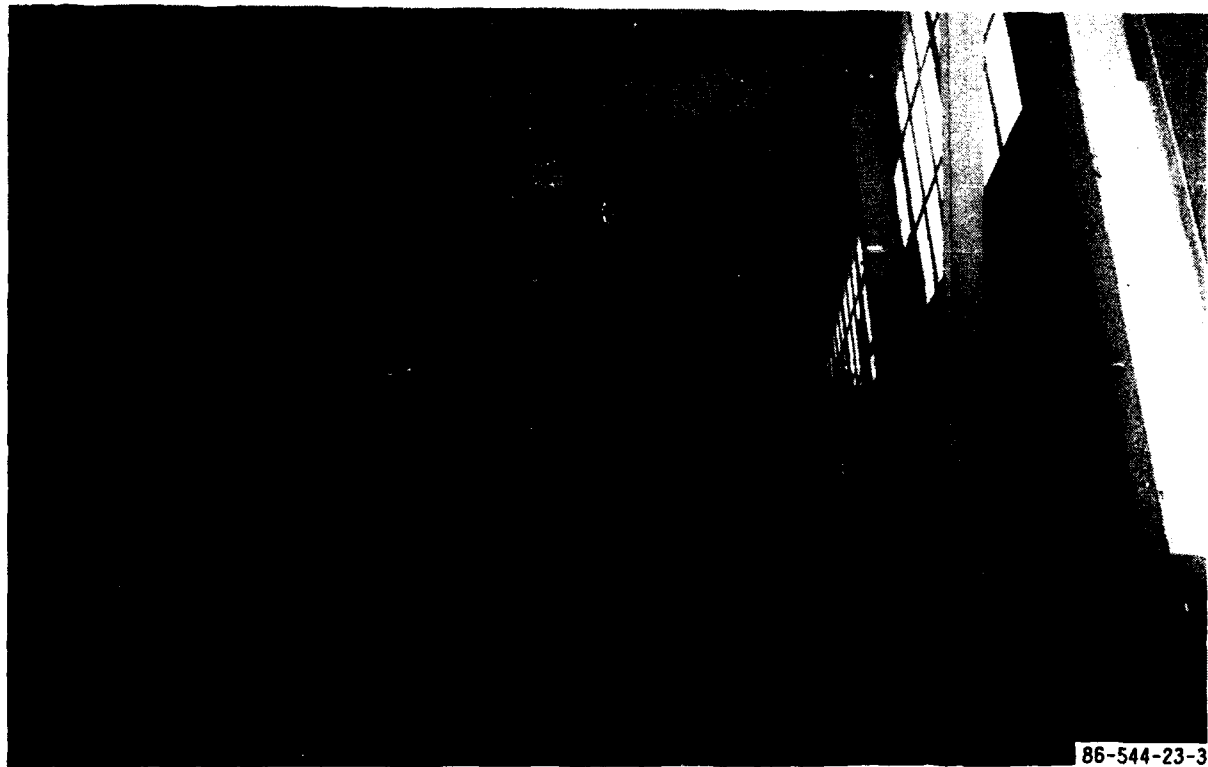


Figure 32. Removing floor-to-ceiling concrete wall using the 500-lb hydraulic jackhammer.

The east mezzanine was removed by jackhammering the concrete floor along the edge of each floor support beam (Figure 33) and torch cutting the rebar, allowing each section to drop to the building floor. Once the concrete sections were on the building floor, they were loaded into a dump truck and transported to the disposal site. Most of the mezzanine floor jackhammering was done by hand because the 500-lb hydraulic jackhammer mounted on a tractor could reach only a few feet across the mezzanine floor (Figure 34). When the concrete floor was removed, the floor supports were torch cut and removed.

The south and west mezzanine floors, because of their construction relative to the building support columns, were removed intact by torch cutting the floor supports and dropping the entire mezzanine floor to the building floor. The concrete was then separated from the steel using the Caterpillar 235/shear.

The acid-proof bricks lining the trenches, sumps, and pits were removed mainly by jackhammering (Figures 35 and 36). Some bricks were loosened from the trenches by using a small tractor/backhoe, but most of the bricks were so well cemented that jackhammering by hand was required. The Caterpillar 235 equipped with a large backhoe (Figure 37) was used to remove many of the bricks from the walls and floor of the cadmium and chrome pits, but jackhammering by hand was required to complete the job.

#### Fill Trenches and Wash Down Building Interior

After the bricks were removed from the trenches, the trenches were cleaned of debris, vacuumed, and filled with concrete (Figure 38). Forms were constructed to prevent the concrete from flowing into the sumps (Figure 39). When the concrete had set up, ripout of the building was completed, all remaining debris was transported to the disposal site, the entire floor area was swept, and the entire interior of the building was washed down with high-pressure water (Figure 40). The liquid from the washdown was collected in the sumps and pits, analyzed, and later disposed of in the McClellan AFB IWCS. This washdown of the building interior to

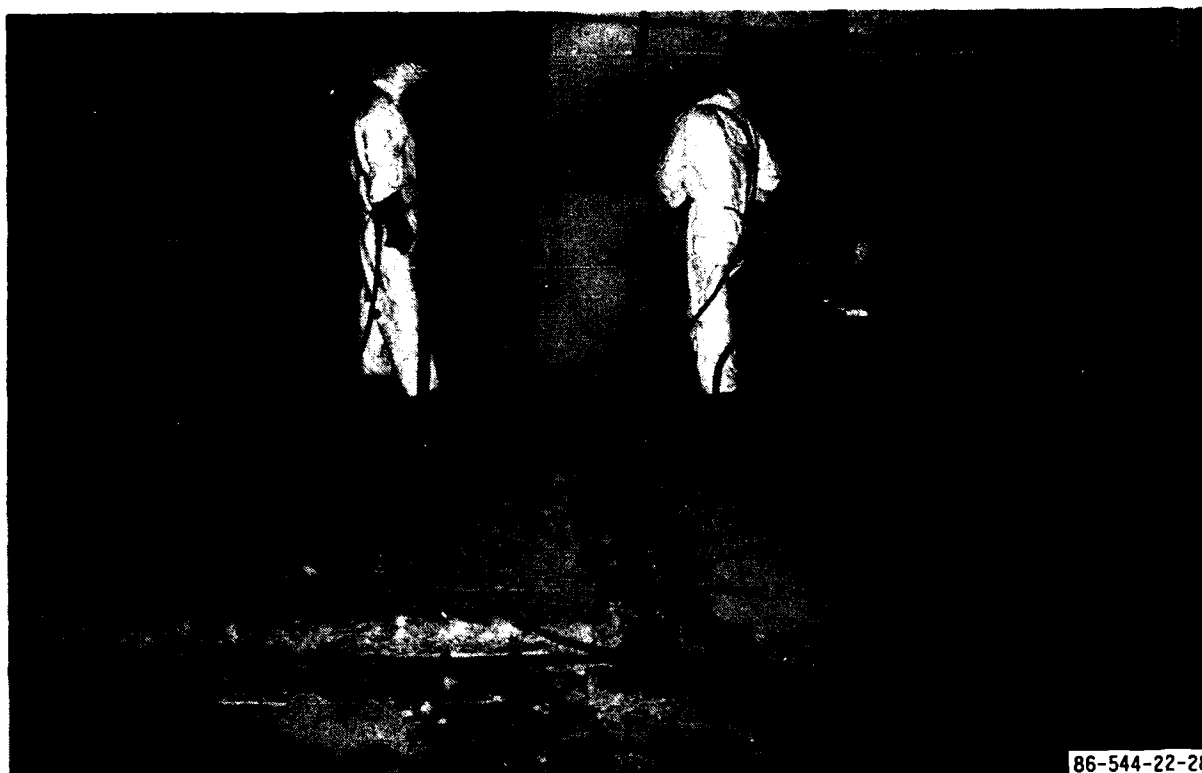


Figure 33. Jackhammering the east mezzanine floor.

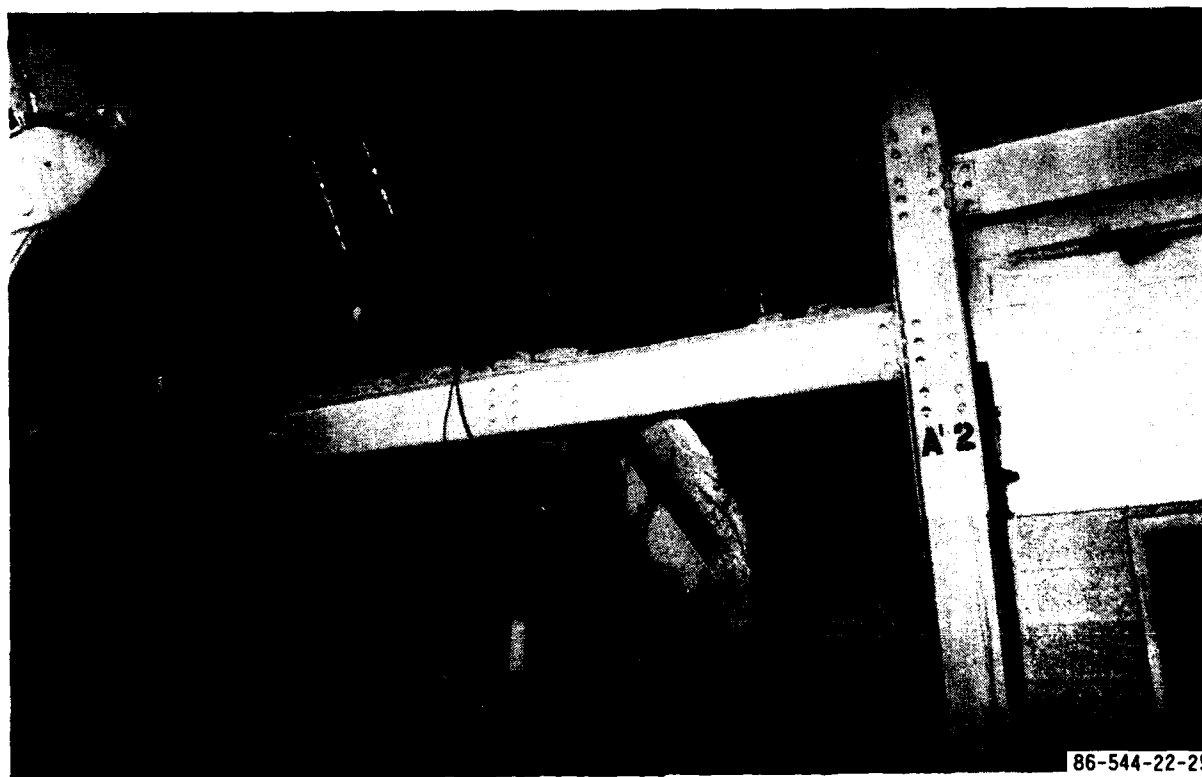


Figure 34. Jackhammering the east mezzanine floor using the 500-lb hydraulic jackhammer.



86-544-23-73

Figure 35. Removing brick liner from a trench.



86-544-24-74

Figure 36. Removing brick liner from a trench.



86-544-24-5

Figure 37. Caterpillar 235/backhoe removing brick liner from the chrome pit.



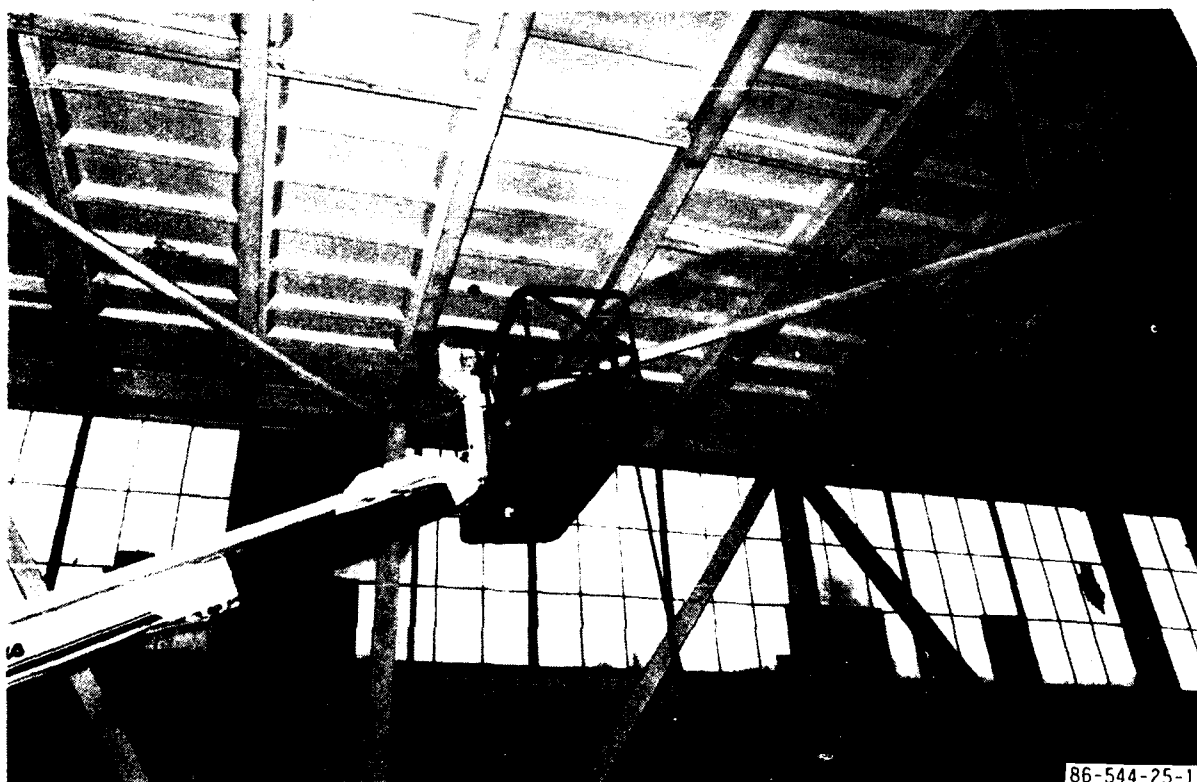
86-544-24-7

Figure 38. Filling trenches with concrete.



86-544-24-4

Figure 39. One of the forms constructed to keep concrete from flowing into the sumps.



86-544-25-16

Figure 40. Washdown of Building 666 interior ceiling and walls.



remove all loose contamination made it possible to perform the roof and wall removal without spreading airborne contamination.

#### Remove, Shear, and Dispose of Miscellaneous Tanks

The two empty tanks located outside Building 666 near the northwest corner (Figure 13) were removed with the grapple (Figure 41) and placed in a pile with other material and debris from outside the building. Later, these tanks were sectioned using the shear (Figure 42), loaded on a dump truck, and transported to the disposal site.

#### Dismantle and Dispose of Roof and Walls

The roofing material was removed by sectioning the material into manageable pieces, prying off the pieces, and dropping them into waste bins inside the building. Most of the sectioning of the roofing material was done with a roofing saw (Figure 43). The roofing material consisted of about 4-in. of insulation beneath tarpaper, tar, and fine gravel. The saw blade was adjusted to cut down to the concrete roof panels. Sections of roofing were pried up by hand with shovels and pry bars (Figure 44) and dropped into waste bins placed beneath openings made by removing a rectangular piece of plywood covering each of the original exhaust ports. These rectangular pieces of plywood were placed over the exhaust ports when the roof was modified a few years ago (Figure 45). Figure 46 shows the roof after the roofing material was removed.

The perimeter concrete roof panels were removed from the roof with the grapple (Figure 47). The standard concrete roof panels were removed by prying them loose and dropping them between the roof supports into a fabricated container mounted to the front-end loader (Figure 48). This container was positioned directly beneath the roof panels being removed. When the container was full, the panels were piled on the building floor for subsequent loading into waste bins or dump trucks with the front-end loader after disconnecting the special container. (The special container was too large to allow direct dumping into a waste bin or dump truck.) Figure 49 is a view from the rooftop of workers removing the standard roof panels. A safety tie-off for each worker was required for this work.

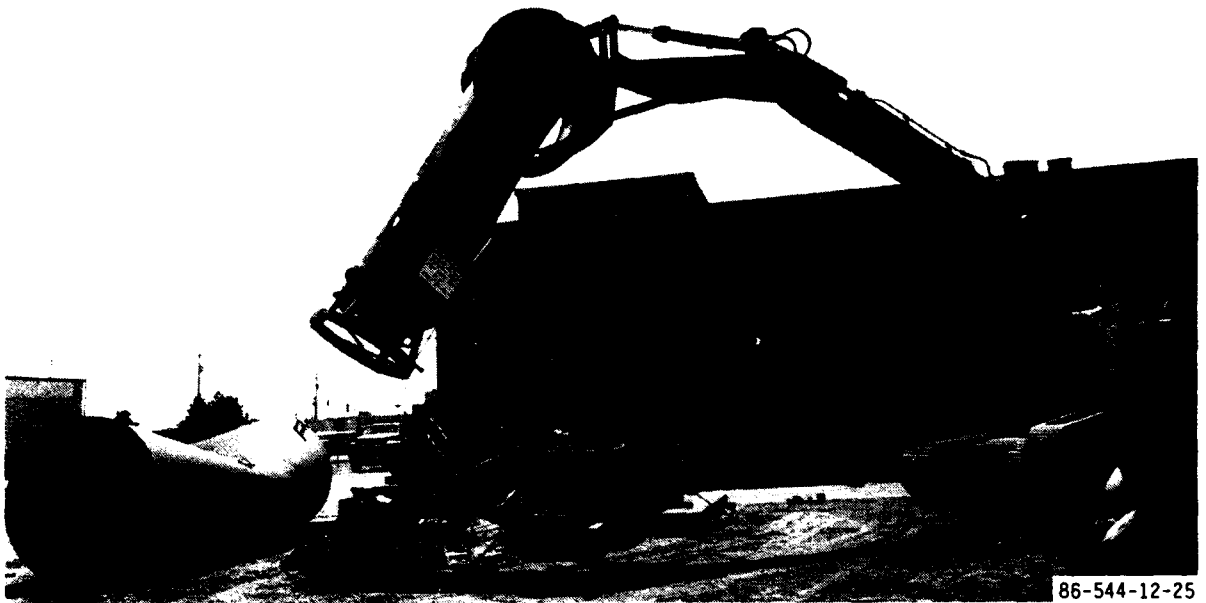


Figure 41. Removing miscellaneous tanks.



Figure 42. Sectioning miscellaneous tanks and other hardware outside the building.



Figure 43. Sawing the roofing material into sections before removal.



Figure 44. Taking up sections of roofing.

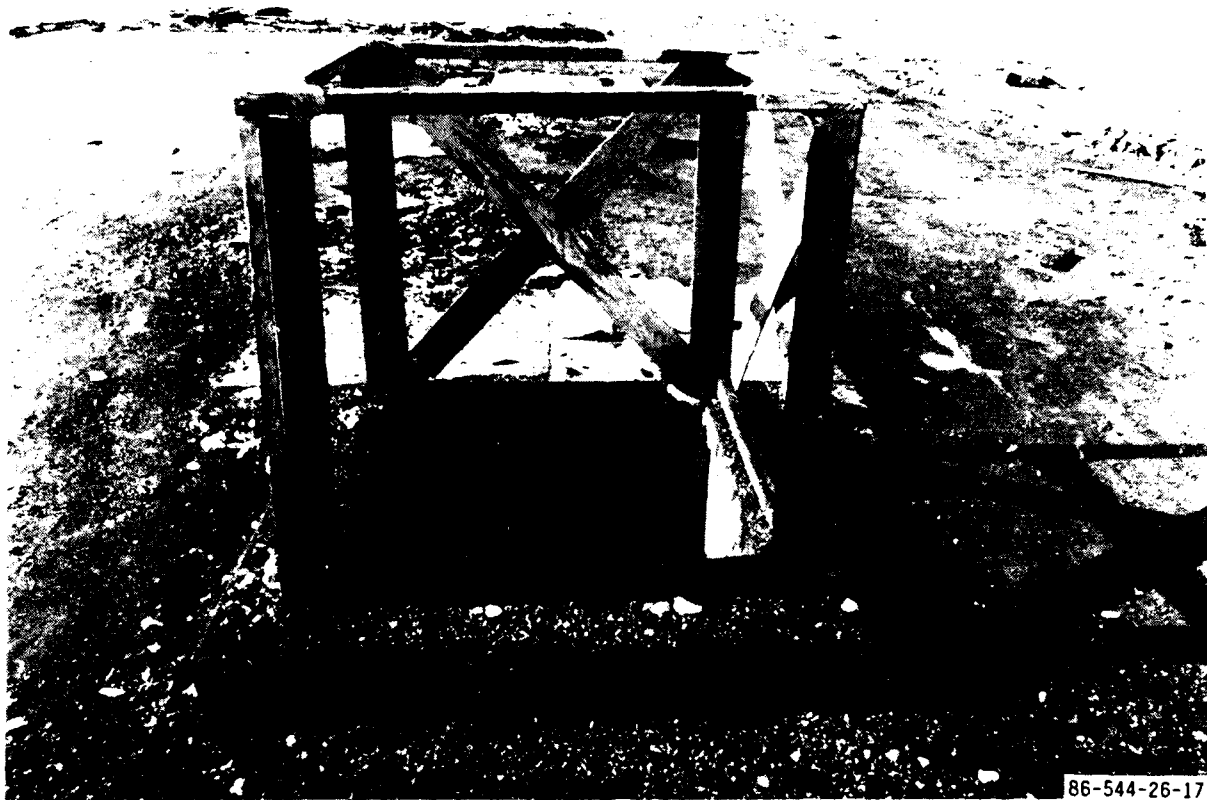


Figure 45. A typical opening made in the roof through which roofing material could be dropped into bins.



Figure 46. Building 566 roof following the removal of the roofing material.

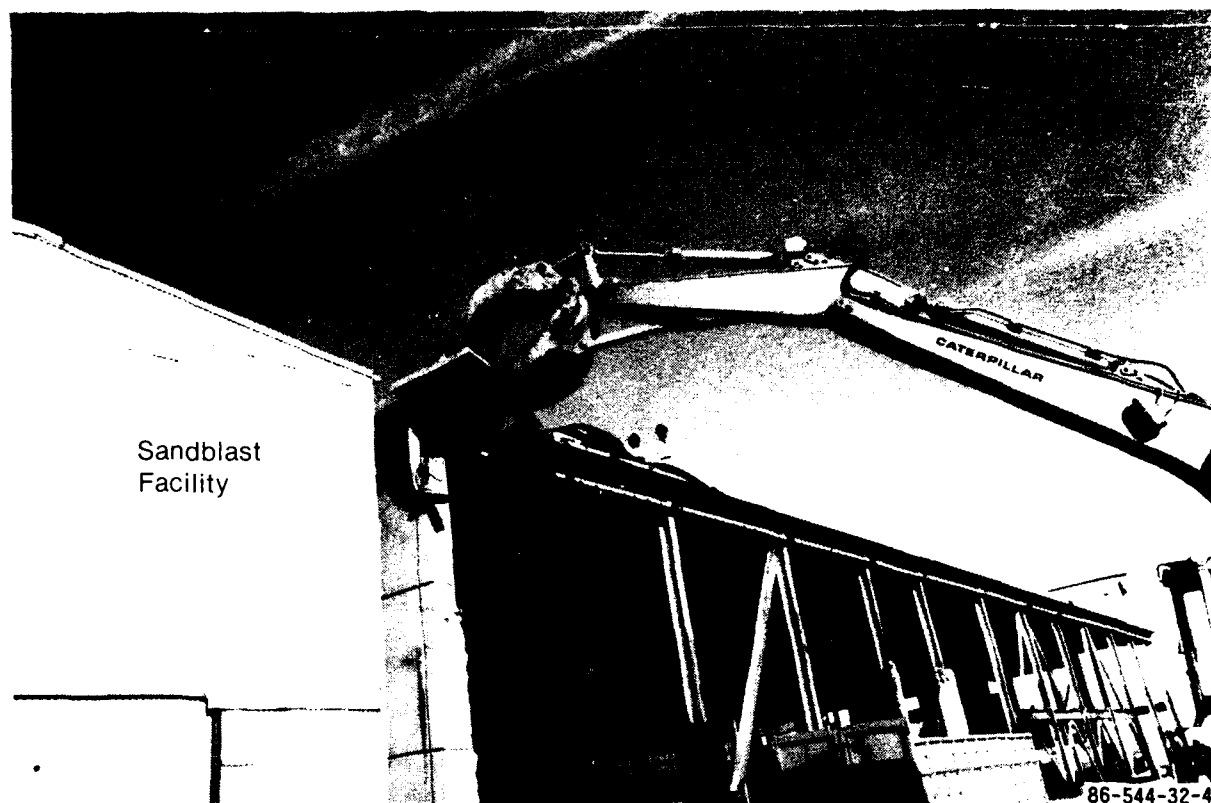


Figure 47. Removing the perimeter roof panels from Bldg. 666 using the Caterpillar 235/grapple.

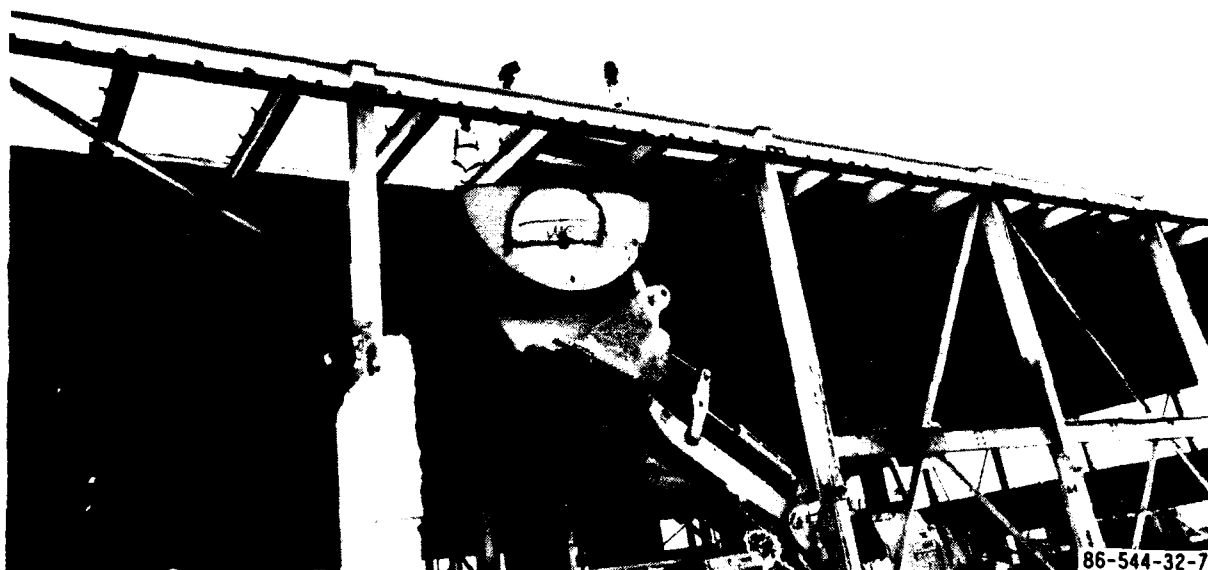


Figure 48. Catching the standard roof panels in the fabricated container.



Figure 49. Workers removing standard roof panels.

The nonstandard concrete roof panels, previously used to support roof ventilating equipment and anchored to the roof support structure, were not removed until the steel structure was dismantled (Figure 50). These panels were left on the steel structure until the steel structure was torch cut and dropped to the floor. While on the floor, these concrete panels were removed using the grapple.

The roof of the HVAC towers was removed in a different way than the main roof. The roofing material was sectioned with hand picks, taken off in slabs, and placed on the main roof for subsequent disposal along with the roofing material from the main roof as explained earlier. The concrete roof panels on the HVAC towers were individually hoisted to the ground with a 25-ton crane (Figure 51). These large panels were later sectioned by jackhammering, and the sections loaded on dump trucks for shipment to the disposal site.

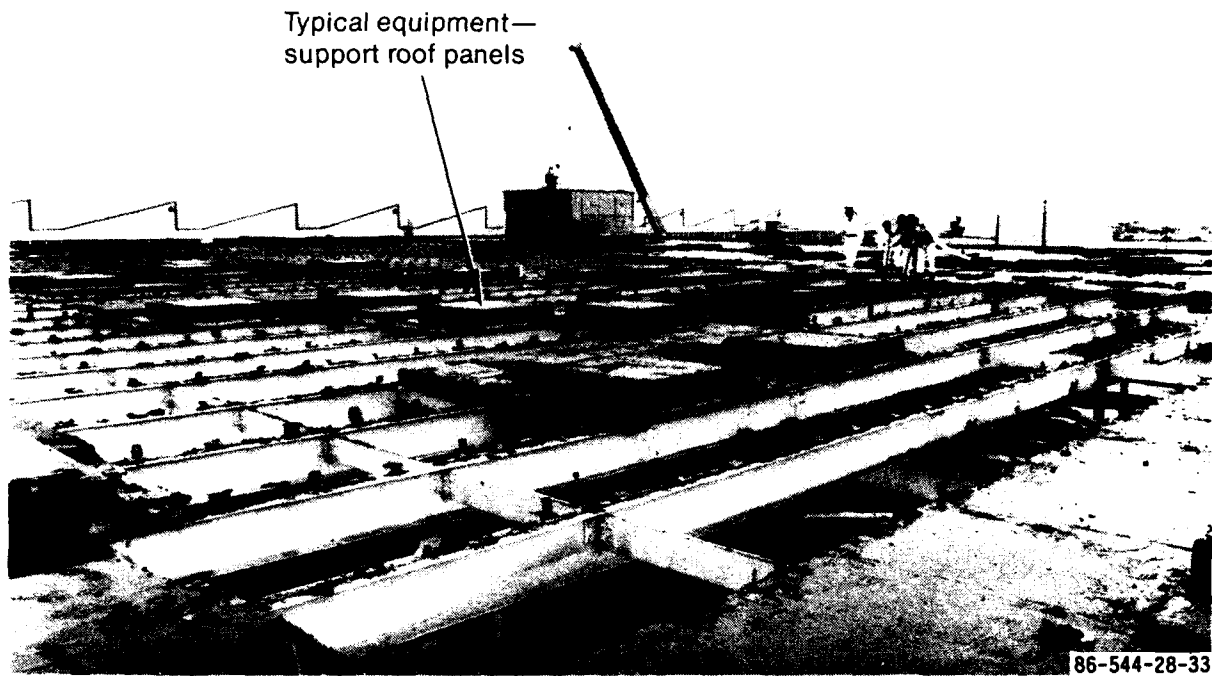


Figure 50. Equipment-support roof panels.



Figure 51. Hoisting HVAC roof panels.

The wall panels were removed in two different ways. The panels that could be reached were grappled with the grapple (Figure 52). Other concrete wall panels were hoisted and laid on the ground with a 75-ton crane (Figure 53). Figure 53 also shows the top of an HVAC tower wall panel being removed. Shown in the photograph are holes that were jackhammered in each wall panel to accommodate rigging. In addition, the photo shows how concrete panels were separated from the pilasters by jackhammering before hoisting.

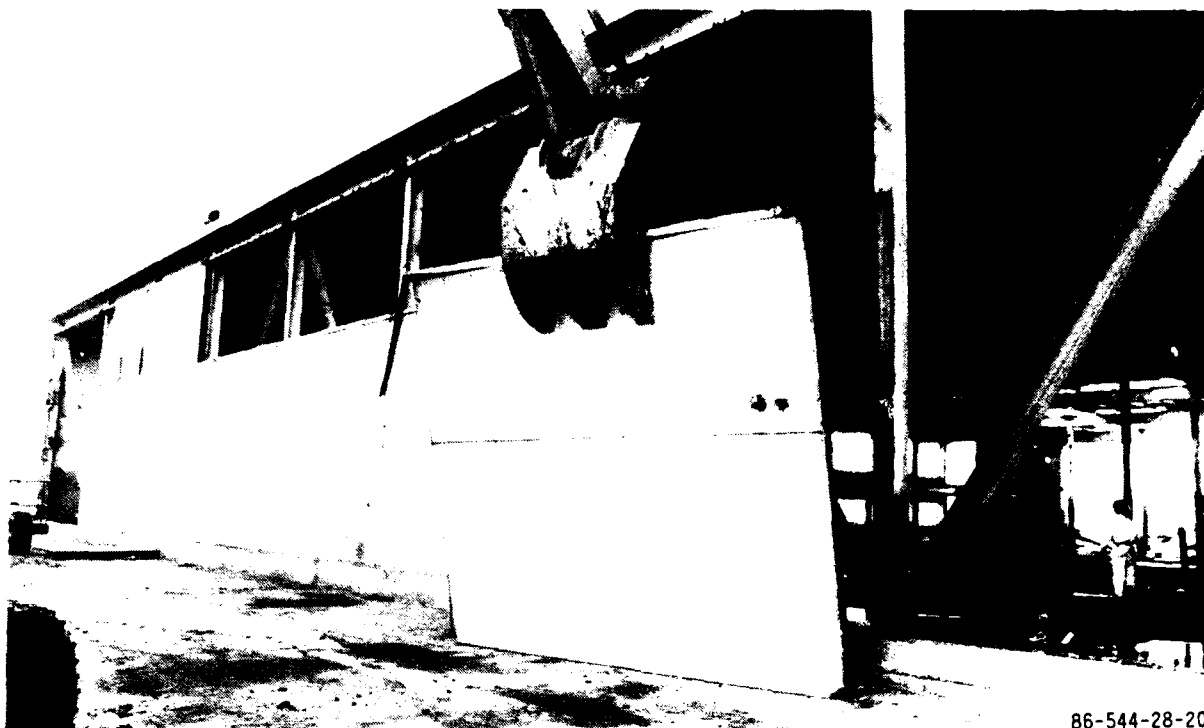
#### Dismantle Steel Structure

Following the removal of the roof and wall of Building 666, the steel structure was dismantled one bay at a time. The building consisted of 49 bays; each bay was a rectangular section of the structure within four major vertical columns.

Each bay was dismantled by torch cutting (a) the diagonal bracing in walls and ceiling if diagonal bracing existed in the bay being dismantled, (b) roof perlins and rivets, (c) outer support columns, and (d) the roof support beams. Before making the final cuts on the roof support beams, the grapple was used to support the structure (Figure 54). This was not necessary, but was done as a safety measure. After all the torch cuts had been made, the grapple was used to pull down that bay or section of structure. Figure 55 shows the last bay being dropped or pulled to the ground. The other bays were pulled down in a similar way. The steel beams were then torch cut into pieces small enough to be decontaminated.

During the torch cutting of steel beams into manageable sizes for decontamination, the burners also trimmed away areas of steel that would be impossible to decontaminate satisfactorily. An example is a section of beam that had its flange crushed against the web of the beam, preventing access to all the contaminated surfaces. A total of 236 tons of an estimated 300 tons of the structural steel were decontaminated and recycled.





86-544-28-20

Figure 52. Removal of wall panels using the grapple.

#### Decontaminate Structural Steel and CO<sub>2</sub> Tank

In addition to decontaminating most of the structure steel for recycling, the 2-ton carbon dioxide tank was decontaminated for reuse at McClellan AFB. During project planning, decontamination of structural steel and the CO<sub>2</sub> tank were considered achievable with reasonable assurance that decontamination could be verified. However, before beginning the effort to decontaminate the structural steel and the CO<sub>2</sub> tank, successful decontamination was demonstrated on representative areas of columns, ceiling beams, and the CO<sub>2</sub> tank. This demonstration was performed using the high-pressure water system that was planned for all the decontamination. Surface samples were collected and analyzed for contaminants found in Building 666. The demonstration decontamination, samples collection, and analyses were performed in accordance with a previously-approved procedure.

After demonstrating that decontamination was achievable, the CO<sub>2</sub> tank was decontaminated first for immediate reuse by the McClellan AFB.

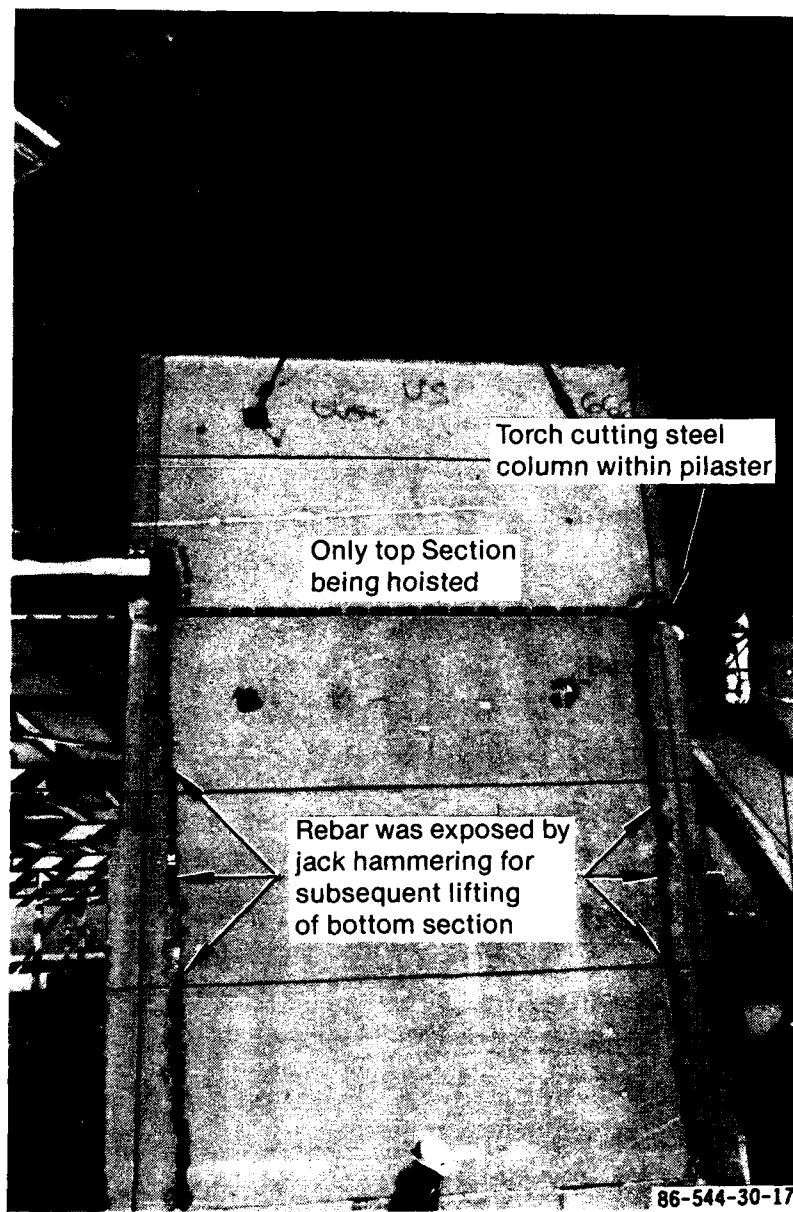


Figure 53. Hoisting top section of wall panel using the 75-ton crane.

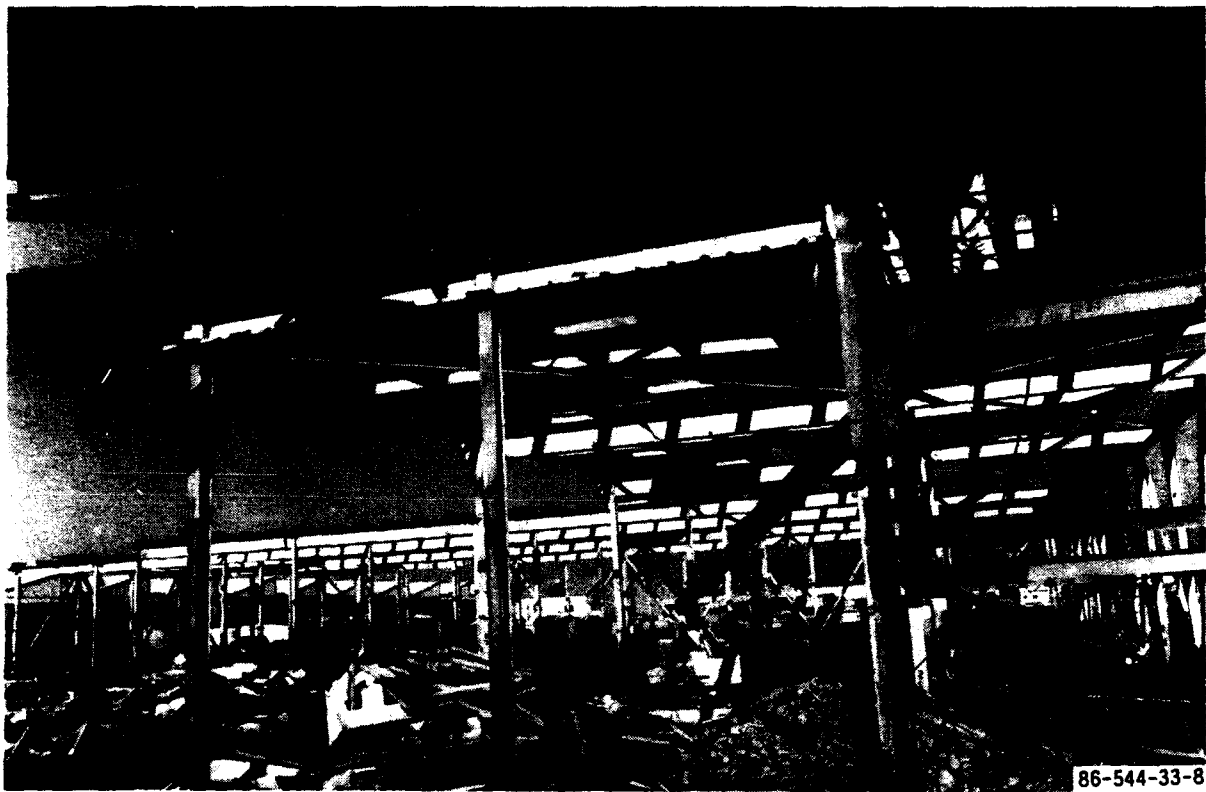


Figure 54. Grapple supporting the structure during torch cutting.



Figure 55. After torch cutting, the last structural bay was dropped using the Caterpillar 235/grapple.

The CO<sub>2</sub> tank was decontaminated in the Sandblast Facility. Figure 56 shows the CO<sub>2</sub> tank being moved from Building 666 before decontamination.

Structural steel decontamination began in the Sandblast Facility, but, after decontaminating about 10% of the estimated 300 tons of steel, the rest of the steel was decontaminated in enclosures constructed on the Building 666 slab.

Initially, the subcontractor responsible for decontamination, IT Corp., believed that the northwest bay of the Sandblast Facility would be an ideal place to decontaminate the structural steel from Building 666 because this bay was above a pit in which liquid could be collected. In addition, the steel floor of this bay contained small holes through which the liquid could flow into the pit. However, the bay was small (about 15 x 15 ft) which required that the steel beams be cut into short lengths. Also, the project was on a tight schedule and, by performing the decontamination in four temporary enclosures, decontamination could be accelerated and the Sandblast Facility could be dismantled in parallel with the decontamination of Building 666 structural steel.

Four wooden frame structures with Visqueen covers were constructed adjacent to the degreaser pit. The liquid resulting from decontamination flowed into the degreaser pit and was later analyzed and disposed of in the McClellan AFB IWCS. Each structure was approximately 19 ft wide x 15 ft long x 8 ft high. Beams up to 15 ft long could be moved into the enclosure with the Bobcat, placed on the slab, decontaminated, then picked up with the Bobcat and taken out of the enclosure to the staging area on the northeast corner of the Building 666 slab. Figure 57 shows steel being handled by the Bobcat, and Figure 58 shows steel being decontaminated in one of the temporary enclosures. Following completion of decontamination, the temporary enclosures were dismantled and disposed of as hazardous waste.

#### Rip Out, Dismantle, and Dispose of the Sandblast Facility

The Sandblast Facility contained equipment and hardware for recycling sand after it had been used to remove paint from metal. Most of this



Figure 56. CO<sub>2</sub> tank being moved from Bldg. 666 prior to dismantlement of the building. The tank was later decontaminated for reuse.

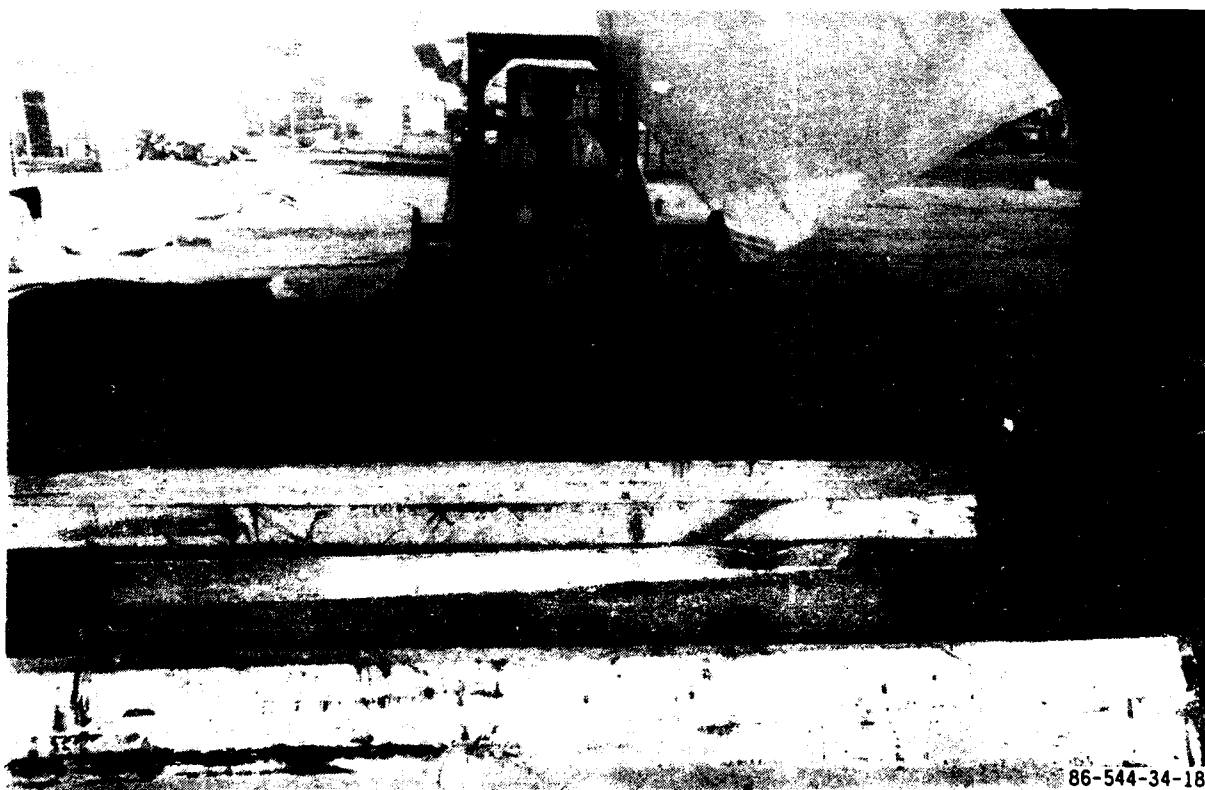


Figure 57. Structural steel being moved into the enclosure for decontamination.



Figure 58. Structural steel being decontaminated for recycling.

equipment was in the east bay of the facility, and was removed by torch cutting the items while the facility remained closed, then later opening the south door and loading the components into a waste bin located just outside the door.

Once the contaminated equipment and components were removed and disposed of, the steel frame and corrugated metal building was dismantled using the Caterpillar shear. Once down, the building was sheared for volume reduction, placed in waste bins, and shipped to the disposal site. Figure 59 shows the building being dismantled.

The substructure beneath the northwest bay of the Sandblast Facility consisted of a cone-shaped steel structure (Figure 60), which was removed from the pit, sheared, and placed in waste bins for shipment to the disposal site.



Figure 59. Sandblast Facility being dismantled using the Caterpillar 235 shear.



Figure 60. Cone-shaped substructure from Sandblast Facility northwest bay.

Considerable time and effort was expended, using a water spray, during the Sandblast Facility dismantlement to control dust because of residual sand located in areas not accessible during previous vacuuming of the sand. The steel floor structure from the southwest bay shown in Figure 61 contained considerable sand. Instead of shearing this structure, it was carefully placed in dump trucks to prevent contamination spread. The Sandblast Facility slab and pit are shown following dismantlement in Figure 62.

#### IWTP No. 4 Dismantlement

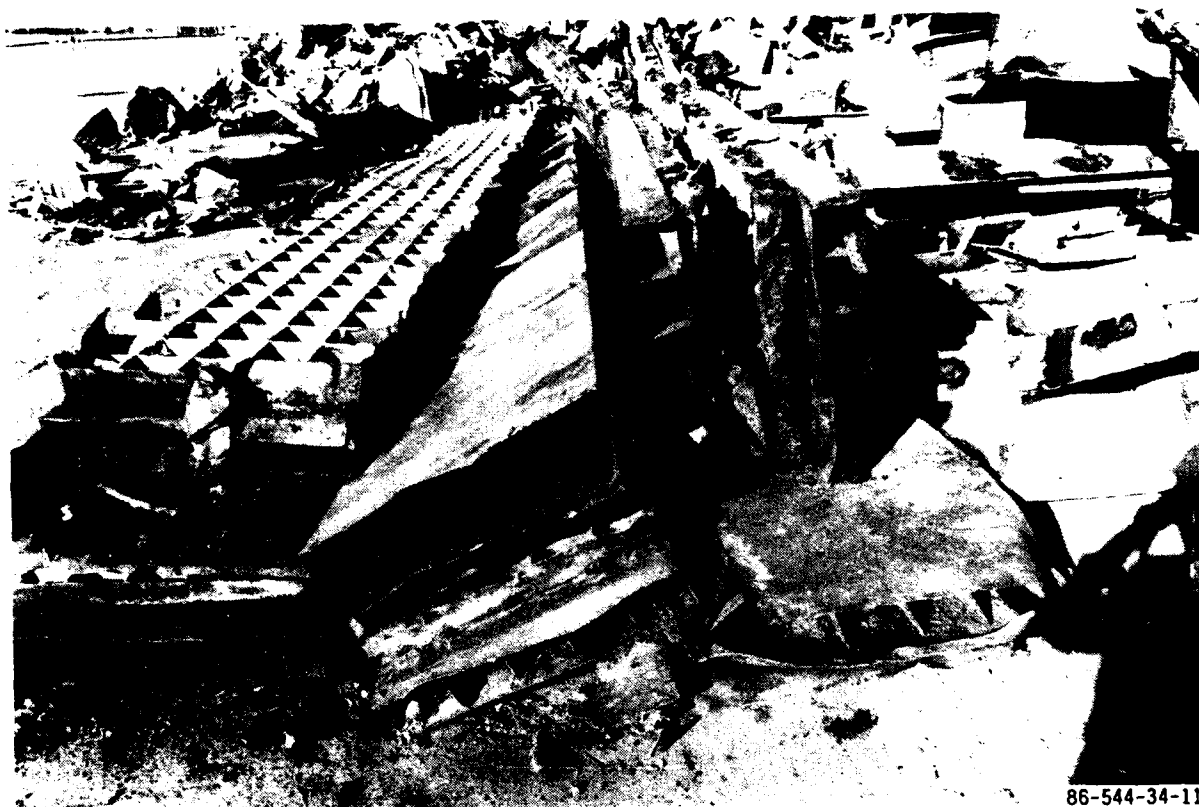
##### Remove and Dispose of All Liquid and Sludge

The residual liquid in the piping was drained or purged with pressurized air, collected in drums, analyzed, and disposed of either in the McClellan AFB IWCS or transported to the off-site disposal site. Liquid disposal into the IWCS required meeting the IWCS acceptance criteria that no restricted hazardous waste (as defined by Title 22, California Administrative Code Section 66900) could be discharged to the IWCS. The only liquid removed from piping that required off-site disposal was about 3-gal of chromic acid. All other liquid from piping was disposed of in the IWCS.

Liquid was also removed from sumps and tanks, analyzed, and disposed of either in the IWCS or off-site depending on the analysis results. The liquid that required off-site disposal consisted of chromic acid, sulfuric acid, and liquid pumped from the cyanide sump (see Figure 17).

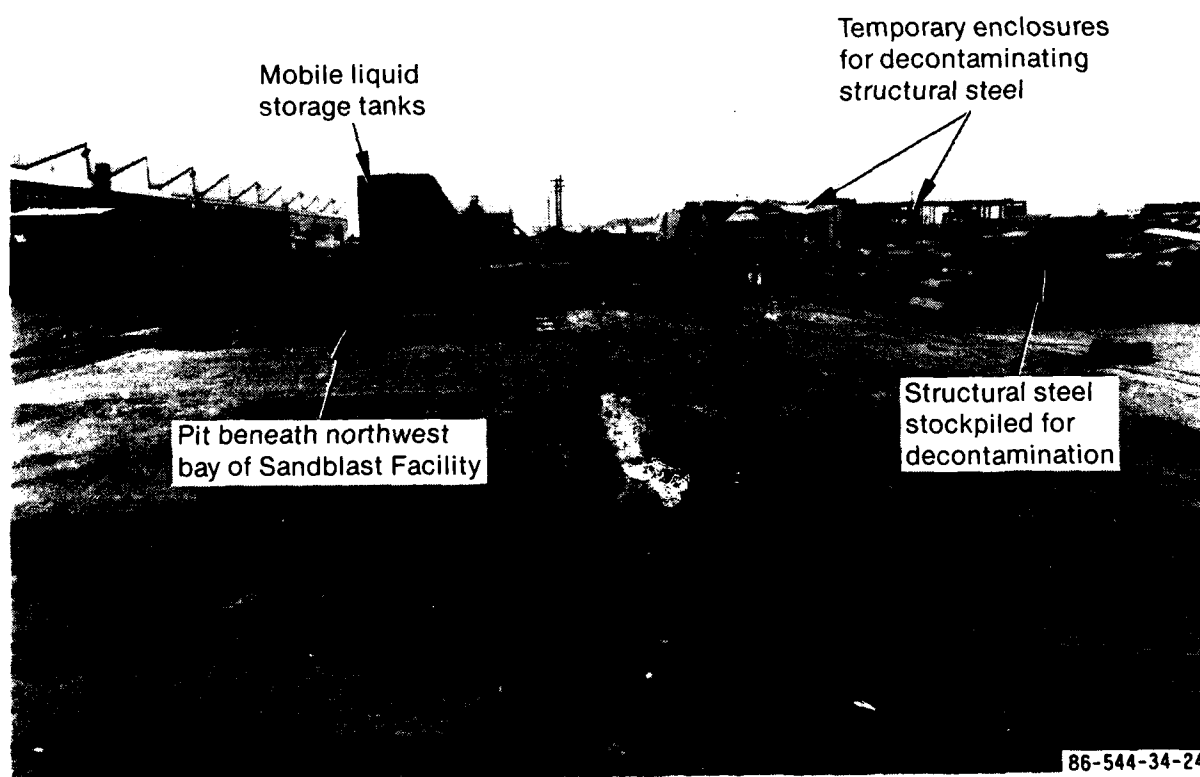
Several of the tanks contained sludge. The open-topped tanks contained dry sludge because the previously accumulated rainwater had evaporated. Tank number 525, the coagulator tank, contained approximately 120,000 lb of dry sludge. Six ion-exchanger tanks contained resin. The tanks containing sludge were accessed by torch cutting a hole near the bottom in the side of the tank. Each tank was then entered, the sludge removed, and the tank interior cleaned and vacuumed (Figure 63). In the case of Tanks 526 and 527, the rubber lining was also removed (Figure 64).





86-544-34-11

Figure 61. Floor structure from Sandblast Facility southwest bay.



Mobile liquid  
storage tanks

Temporary enclosures  
for decontaminating  
structural steel

Pit beneath northwest  
bay of Sandblast Facility

Structural steel  
stockpiled for  
decontamination

86-544-34-24

Figure 62. Sandblast Facility slab and pit following dismantlement.



Figure 63. Sludge being removed from Tank 525.



Figure 64. Interior liner being removed from Tank 526.

The resin in tanks 508 and 509 was removed by torch cutting a small opening in each tank and vacuuming the resin beads into 55-gal drums for disposal. The resin from the larger tanks 510, 511, 512, and 513 was vacuumed into a vacuum truck (Figure 65) and later transferred into waste bins.

#### Remove and Dispose of All Piping, Valves, Pumps, and Tanks

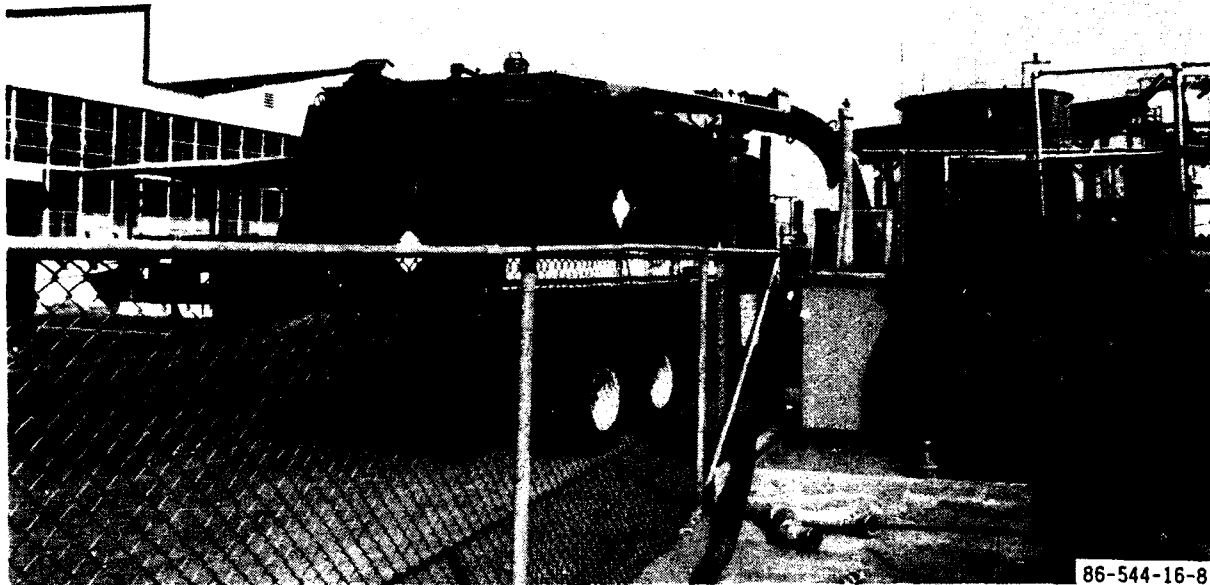
The piping and tanks in the IWTP-4 were mechanically sheared using the Caterpillar 235/shear and disposed of along with the valves, pumps, and other hardware. Disposal consisted of hauling the waste to the hazardous waste disposal site by dump trucks. Figure 66 shows mechanical shearing of piping in the south section of the IWTP-4.

Some piping in the northwest part of the north section of the IWTP was removed by hand instead of shearing off directly using the shear. This was done to prevent damaging the perimeter fence in the northwest corner of the site and Air Force trailers located outside and near the perimeter fence. This piping was removed by rigging, torch cutting the flange bolts, and hoisting the piping to the ground for subsequent sectioning using the shear (Figure 67).

In addition to the piping in the northwest corner of the IWTP-4, tank 525 superstructure was rigged, torch-cut free, and hoisted to the ground (Figure 68). This was also done to reduce the risk of damaging the perimeter fence and the Air Force trailers located just outside the west perimeter fence near the northwest corner.

#### Dismantle and Dispose of Building 645B

The interior of Building 645B was cleaned and vacuumed before dismantlement. The building and foundation were then dismantled (Figure 69) using the grapple, sheared for volume reduction, loaded into a dump truck, and transported to the hazardous waste disposal site.



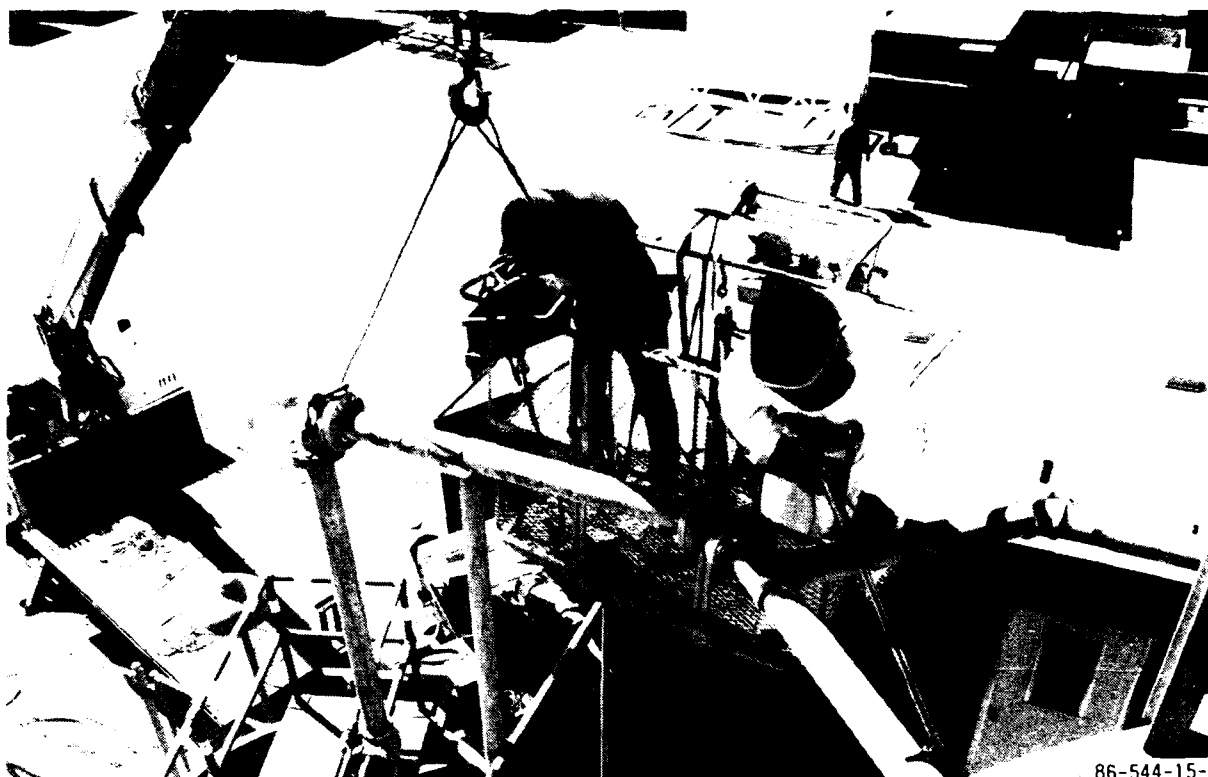
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Figure 65. Resin beads being vacuumed from ion exchangers. Ion exchangers are not shown in the photograph.



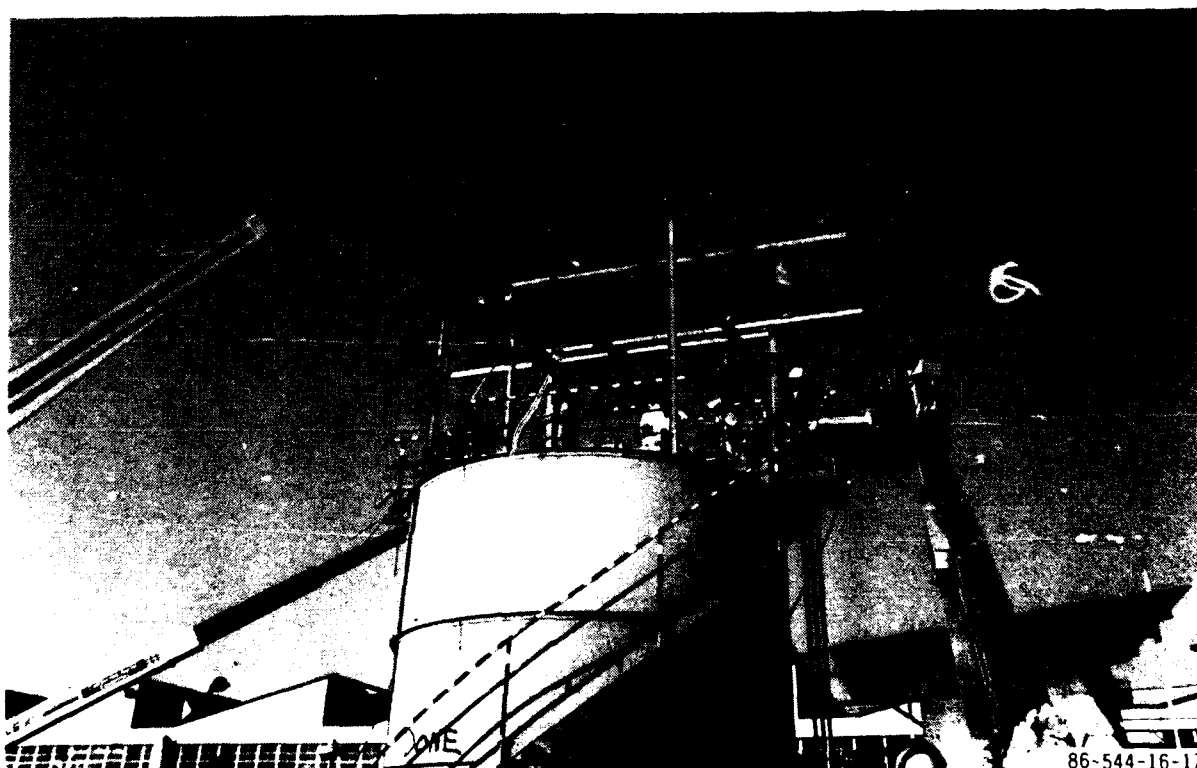
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Figure 66. Mechanically shearing the IWTP No. 4 components using the Caterpillar 235/shear.



86-544-15-12

Figure 67. Piping near the northwest corner of the IWTP-4 north section being rigged for hoisting to the ground.



86-544-16-17

Figure 68. Tank 525 superstructure being hoisted to the ground.



Figure 69. Dismantling Building 645B using the Caterpillar 235/grapple.

#### Site/Facility Stabilization

The purpose of stabilizing the Building 666/IWTP-4 site was to prevent the spread of contamination in the soil beneath the concrete foundation and floor. Stabilization consisted of filling all the trenches with concrete, constructing concrete curbs around each sump and pit, and constructing rain-tight covers over each sump and pit.

#### Fill Trenches, Drains, and Floor Penetrations

The entire system of trenches inside Building 666 was filled with concrete after all the acid-resistant bricks were removed and the trenches cleaned and vacuumed.

During the building ripout, the floor drains were filled with concrete. In addition, as piping and conduit were removed leaving penetrations in the floor of Building 666 and the IWTP No. 4, these penetrations were filled with concrete.

When dismantlement was completed, damaged concrete that could allow rainwater to penetrate the soil beneath the concrete slabs was filled or resurfaced with concrete.

#### Construct Covers Over Pits, Sumps, and Openings to Underground Tanks

Covers were constructed over the cadmium, chrome, degreaser, and Sandblast Facility pits; the two plant water reservoirs in the south section of the IWTP No. 4; eight sumps previously inside Building 666 not including a sump in each of the pits in Building 666; the cyanide sump in the south section of the IWTP No. 4; a shallow sump previously near tank 522; the sludge sump previously north of tank 525; and the valve pit previously adjacent to tank 525 in the north section of the IWTP No. 4.

These covers were designed and built to prevent rainwater entering the sumps, pits, or underground tanks. To prevent any surface water running into the sumps, pits, or underground tanks, concrete curbs were constructed on which the covers were built. Figures 70 through 72 show the covers being constructed over the chrome pit, cadmium pit, and sandblast pit.



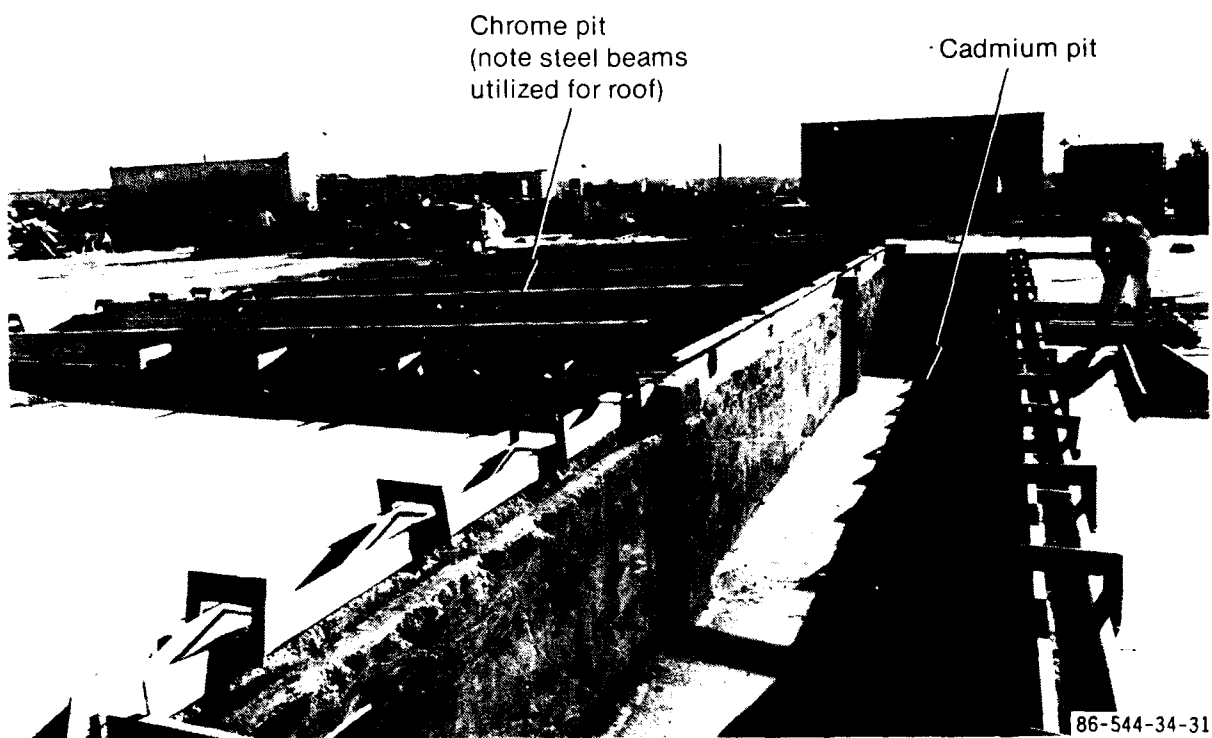


Figure 70. Forms for concrete curbs being constructed around cadmium pit.



Figure 71. A single roof was constructed over the chrome, cadmium and miscellaneous pits.



Figure 72. The roof being constructed over the Sandblast Facility pit.

## PROJECT SCHEDULE AND COST

The project schedule, including project planning, is shown in Figure 73. Only the major project activities or tasks are shown.

The gap in the schedule of approximately 7-1/2 months between November 1986 and July 1987 was due to a stop-work order issued by the Air Force. The order was issued to allow the Air Force time to modify the contract to meet off-site disposal requirements for superfund waste identified in the Superfund Amendments and Reauthorization Act enacted in October 1986. During the stop-work period, the contract awarded in October 1986 was renegotiated and modified to reflect a change in the off-site disposal site.

The total cost for dismantlement of Building 666 and IWTP-4 was the contract amount plus the amount paid to the INEL. The total cost does not include the management and administrative costs incurred by McClellan AFB organizations such as EM, PMK, Legal, Auditing, and Civil Engineering.

The dismantlement contract amount was \$2.7 million paid to Bierlein Industrial Services. The INEL was paid \$256K for preparation of the SOW, evaluation of proposals, performance of on-site inspection services, project photography, and perimeter air monitoring for the project's duration, structural analysis as required by EM, and preparation and publication of the Final Report.

## WASTE MANAGEMENT

Building 666 (excluding the CO<sub>2</sub> tank and the structural steel), the IWTP-4, and their contents were disposed of as hazardous waste. The CO<sub>2</sub> tank was decontaminated for reuse, and the structural steel was decontaminated and recycled.

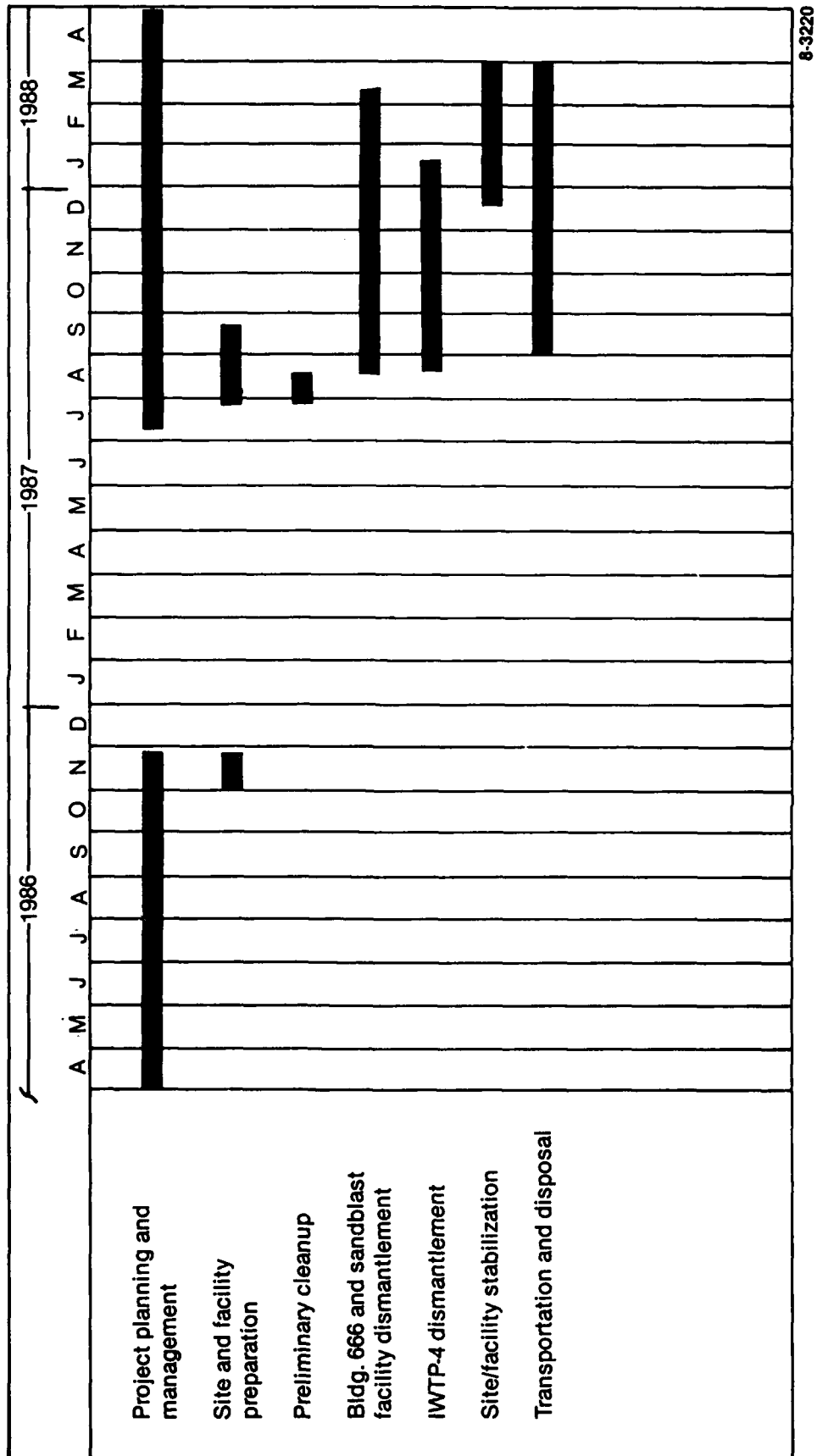


Figure 73. Bldg. 666/IWTP No. 4 dismantlement project schedule.

### Establishment of Waste Profiles

Representative samples of solids and liquids were collected by the contractor from selected locations within Building 666 and the IWTP-4. These representative samples were submitted to an analytical laboratory for analysis to obtain information on the hazardous content of the waste required by the operator of the treatment, storage, and disposal facility (TSDF) to which the waste was transported. Following the analysis, Waste Profile Questionnaires were prepared and submitted to the TSDF. In the case of liquid waste, a sample of liquid was sent to the TSDF along with the questionnaire. This allows the TSDF to perform an independent acceptance analysis of the liquid before receiving the liquid shipment. In the case of solid waste shipments, the TSDF extracts a sample from the first load of waste described in the profile description. The TSDF performs their acceptance analysis (either liquid or solid) and compares the results to the waste description on the Profile Questionnaire. If there are no significant differences, the TSDF accepts the waste.

Most of the liquid waste generated during the dismantlement of Building 666 and the IWTP-4 met the McClellan IWTP acceptance criteria and was disposed of on base by pumping into the IWCS.

### Manifesting Waste Shipments

After the TSDF operator accepted the waste, each off-site waste shipment was manifested using the California Department of Health Services (DHS) Form Number 8022A (Uniform Hazardous Waste Manifest).

The manifest describes the waste being shipped, including the hazard. This information enables emergency teams to take appropriate actions in the event of a spill enroute to the TSDF. In addition, copies of the manifest are sent to the waste generator and the DHS following delivery of the shipment. This serves as notification that the waste shipment was received by the TSDF.

### Waste Volume Generated

The waste volume generated during this project is summarized in Table 5. The waste volume transported to the two disposal sites (U.S. Pollution Control, Inc., Clive, Utah (USPCI); and EnviroSAFE Services of Idaho, Inc., Grandview, Idaho (ESI)) was determined from 152 separate waste manifests. There were 96 shipments to USPCI and 56 shipments to ESI. Shipments to ESI were started on January 28, 1988, to reduce disposal costs.

TABLE 5. HAZARDOUS WASTE VOLUME GENERATED DURING THE DISMANTLEMENT OF BUILDING 666 AND THE IWTP NO. 4

Type and Description of Waste	Volume of Liquid	Weight of Solid (lb)	Estimated Volume of Solid (yd <sup>3</sup> )	Disposition
Solid: Facility material mostly metal and concrete.	N/A	3,128,260	3128	USPCI
Solid: Facility material mostly metal and concrete.	N/A	2,225,790	2225	ESI
Solid: Resin beads from IWTP-4 ion exchangers.	N/A	56,980	38	USPCI
Solid: Sand from Sandblast Facility.	N/A	51,920	13	USPCI
Solid: Dry sludge from IWTP-4 tank bottoms and Building 666 chrome pit.	N/A	138,550	51	USPCI
Solid: Ballast transformers from light fixtures. Possibly contaminated with polychlorinated biphenyls.	N/A	Unknown	4-55 gal drums with 500 transformers (actual volume)	USPCI
Liquid: Liquid from chromic and sulfuric acid tanks in IWTP-4 and sump liquid with excessive halogenated compounds.	36-55 gal drums	N/A	N/A	USPCI
Liquids: Liquid which met Air Force acceptance criteria for disposal in McClellan AFB IWCS.	161,900 gal	N/A	N/A	McClellan AFB IWCS
Liquid: Liquid vacuumed from facility sumps and pits at the end of project.	4,026 gal (tank truck)	N/A	N/A	ESI

a. Approximately 1,900 gal of this liquid were originally in sumps, pits, and tanks which met Air Force acceptance criteria for disposal in the McClellan IWCS. The acceptance criteria required that no restricted hazardous waste (as defined by Title 22, California Administrative Code, Section 66900) be discharged into the IWCS. The remaining 160,000 gal were generated during decontamination of building interior, concrete floor, structural steel, and collected rainwater prior to covering pits and sumps.

## AIR MONITORING

Air monitoring during this project was performed for two reasons: to protect project workers and to prevent contamination from leaving the dismantlement site. International Technology, Inc., the subcontractor, performed air monitoring to determine adequate personal respiratory protection as part of the project's health and safety program. In addition, the on-site inspector from the INEL performed site perimeter air monitoring to verify that no significant airborne contamination was leaving the Building 666/IWTP-4 area.

### Personal Air Monitoring

Personal air monitoring was performed by attaching an air pump and filter cassette or a direct reading colorimetric indicator tube on individuals at the beginning of each project phase that could present a new or different contamination hazard. The filter cassettes were analyzed at an off-site analytical laboratory. The direct reading colorimetric indicator tube was read immediately by the project Health and Safety Coordinator. The direct reading colorimetric tubes were used to determine the concentration of engine exhaust components such as CO, SO<sub>2</sub>, and NO<sub>2</sub>. The air filters were analyzed for various heavy metals.

The direct reading tubes were used periodically during the day inside the closed building when heavy equipment was being operated. These tubes often showed an increase in the concentration of CO, SO<sub>2</sub>, and NO<sub>2</sub> during the day, which required workers inside the building to replace their half-face respirators with supplied air.

Before obtaining analytical results of air sampling, respiratory protection was determined by the Health and Safety Coordinator. The protection was usually one which offered the maximum protection such as supplied air. In some cases, after obtaining analytical results, the respiratory protection could be downgraded to a half-face respirator with a combination filter.



### Perimeter Air Monitoring

Perimeter air monitoring was performed during the entire dismantlement project. Air monitoring was performed for heavy metals from July 20, 1987 through March 15, 1988. Air monitoring for asbestos was performed from July 20, 1987 through September 28, 1987. Monitoring for asbestos was discontinued after all the asbestos panels in Building 666 had been removed, packaged, and transported to the disposal site.

Background levels for heavy metals and asbestos were established by monitoring for one week before starting the dismantlement project. Background for asbestos was less than 0.001 fibers/cc. Background for heavy metals measured during the week of July 20-24, 1987 are given in Table 6.

Monitoring for heavy metals and asbestos was performed using eight pumps at four different perimeter locations (Figure 25); one pump for heavy metals and one pump for asbestos at each location. The air pumping rate was 1.5 liters/minute for heavy metals and 2.5 liters/minute for asbestos. Filters on the air pumps were replaced at the end of each week.

The air sample filters were analyzed by the Air Force. Analysis results show asbestos concentrations no greater than background. Heavy metals concentrations were no greater than background except on eight occasions during the eight-month project. The dates (1 week periods) during which the metals concentrations exceeded the background level and the concentrations are shown in Table 6.

TABLE 6. PERIMETER AIR SAMPLES THAT EXCEEDED BACKGROUND

<u>Week</u>	<u>Metal</u>	<u>Perimeter Location Number<sup>a</sup></u>	<u>Concentration (<math>\mu\text{g/liter}</math>)</u>	<u>Background Concentration<sup>b</sup> (<math>\mu\text{g/liter}</math>)</u>
August 17-21, 1987	Pb	2	$2.3 \times 10^{-3}$	$<2.3 \times 10^{-4}$
August 24-28	Pb	2	$7.5 \times 10^{-4}$	$<2.3 \times 10^{-4}$
September 8-11	Pb	2	$9.8 \times 10^{-4}$	$<2.3 \times 10^{-4}$
September 8-11	Pb	3	$8.4 \times 10^{-4}$	$<2.2 \times 10^{-4}$
September 28-October 2	Pb	2	$3.9 \times 10^{-3}$	$<2.3 \times 10^{-4}$
September 28-October 2	Cu	2	$5.2 \times 10^{-4}$	$<2.3 \times 10^{-4}$
September 28-October 2	Cd	2	$2.9 \times 10^{-4}$	$<2.3 \times 10^{-4}$
September 28-October 2	Cr	2	$4.2 \times 10^{-4}$	$<2.3 \times 10^{-4}$
October 13-16	Pb	2	$8.9 \times 10^{-4}$	$<2.3 \times 10^{-4}$
October 26-30	Pb	1	$9.7 \times 10^{-4}$	$2.9 \times 10^{-4}$
November 9-13	Pb	1	$6.2 \times 10^{-4}$	$2.9 \times 10^{-4}$
January 4-8, 1988	Pb	1	$8.4 \times 10^{-4}$	$2.9 \times 10^{-4}$
January 4-8	Cd	1	$7.2 \times 10^{-4}$	$<2.1 \times 10^{-4}$
January 4-8	Cr	1	$7.2 \times 10^{-4}$	$<2.1 \times 10^{-4}$
January 4-8	Cd	2	$6.2 \times 10^{-4}$	$<2.3 \times 10^{-4}$
January 4-8	Cr	2	$5.9 \times 10^{-4}$	$<2.3 \times 10^{-4}$
January 25-30	Pb	3	$6.4 \times 10^{-4}$	$<2.2 \times 10^{-4}$
January 25-30	Pb	4	$4.3 \times 10^{-4}$	$<2.3 \times 10^{-4}$
February 1-6	Pb	1	$1.7 \times 10^{-3}$	$2.9 \times 10^{-4}$
February 1-6	Pb	2	$4.3 \times 10^{-4}$	$<2.3 \times 10^{-4}$
February 8-12	Pb	1	$8.1 \times 10^{-4}$	$2.9 \times 10^{-4}$
February 22-27	Pb	1	$1.8 \times 10^{-3}$	$2.9 \times 10^{-4}$
March 14-15	Pb	1	$1.6 \times 10^{-3}$	$2.9 \times 10^{-4}$

a. Refer to Figure 25 for perimeter location numbers.

b. Background measurements were made during week of July 20 through 24, 1987, prior to start of dismantlement.

## POST-DISMANTLEMENT CONDITION

Figure 74 is an illustration of Site 47 (originally Building 666 and the Sandblast Facility) and Site 48 (originally IWTP No. 4) showing the approximate location of sumps, pits, and openings to the two underground plant water reservoirs. The sumps and pits are named or numbered in Figure 74. These designations are referenced in this section. The approximate depths of the sumps, pits, and underground tanks are given in Table 7. Figure 75 is a photograph of Sites 47 and 48 looking north.

### Site 47

Site 47 consists of the original concrete floor of Building 666 and the Sandblast Facility with all trenches, floor drains, and piping and conduit penetrations filled with concrete, and all sumps and pits covered with rain-tight roof structures. There are ten separate roof structures at Site 47; some are shown in Figure 76. The large roof structure in Figure 76 covers the chrome pit, cadmium pit, miscellaneous pit at the northwest corner of the chrome pit, and sump #5 on the south side of the cadmium pit. Each of the three pits covered by this roof structure contains a sump (Figure 74). An inspection port was constructed in this large roof structure directly above each of these three pit sumps as well as sump #5. The purpose of the inspection ports is to allow each sump to be monitored for possible accumulation of liquid before the future remedial action at Sites 47 and 48.

In addition to the large roof structure, a separate roof structure was constructed over the degreaser pit, Sandblast Facility pit, and the manway to the pit and sumps 1, 2, 3, 4, 6, 7, and 8. The cover over sump #8 is shared with sump #9 which is part of Site 48 (Figure 74). The degreaser pit roof structure has an inspection port directly above the pit sump (Figure 77).

The roof structure above the Sandblast Facility pit and manway to the pit has an inspection port above the manway and one above the deepest part of the pit (see Figure 78).

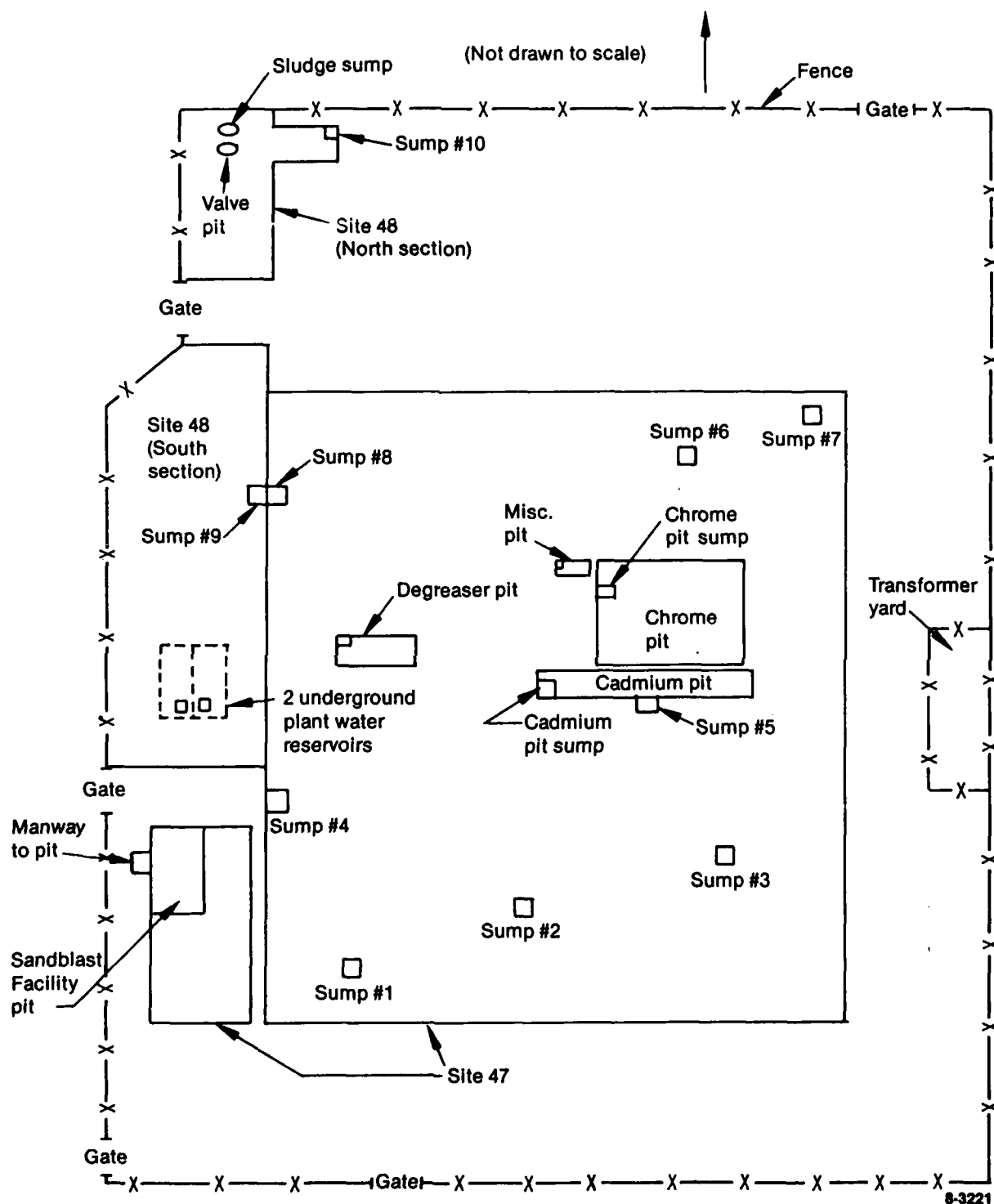


Figure 74. Sites 47 and 48 showing approximate location of sumps, pits, and openings to underground plant water reservoirs.

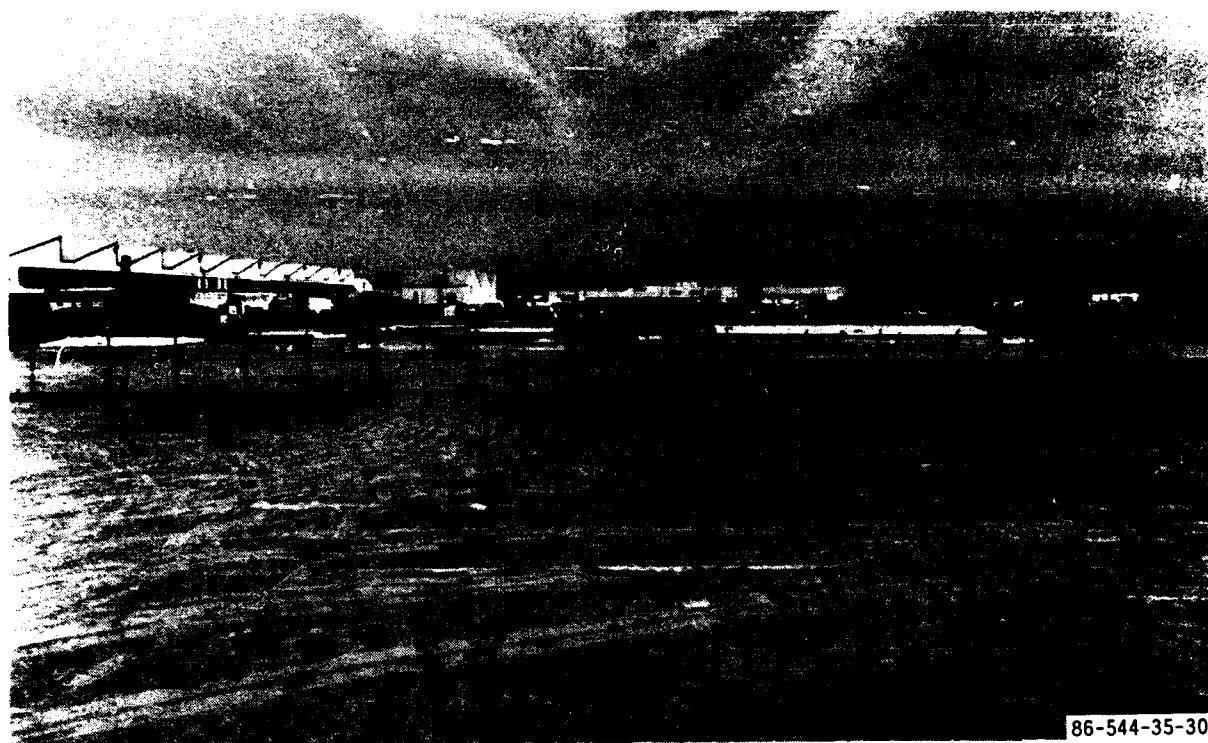


Figure 75. Post-dismantlement condition of Sites 47 and 48 looking north.

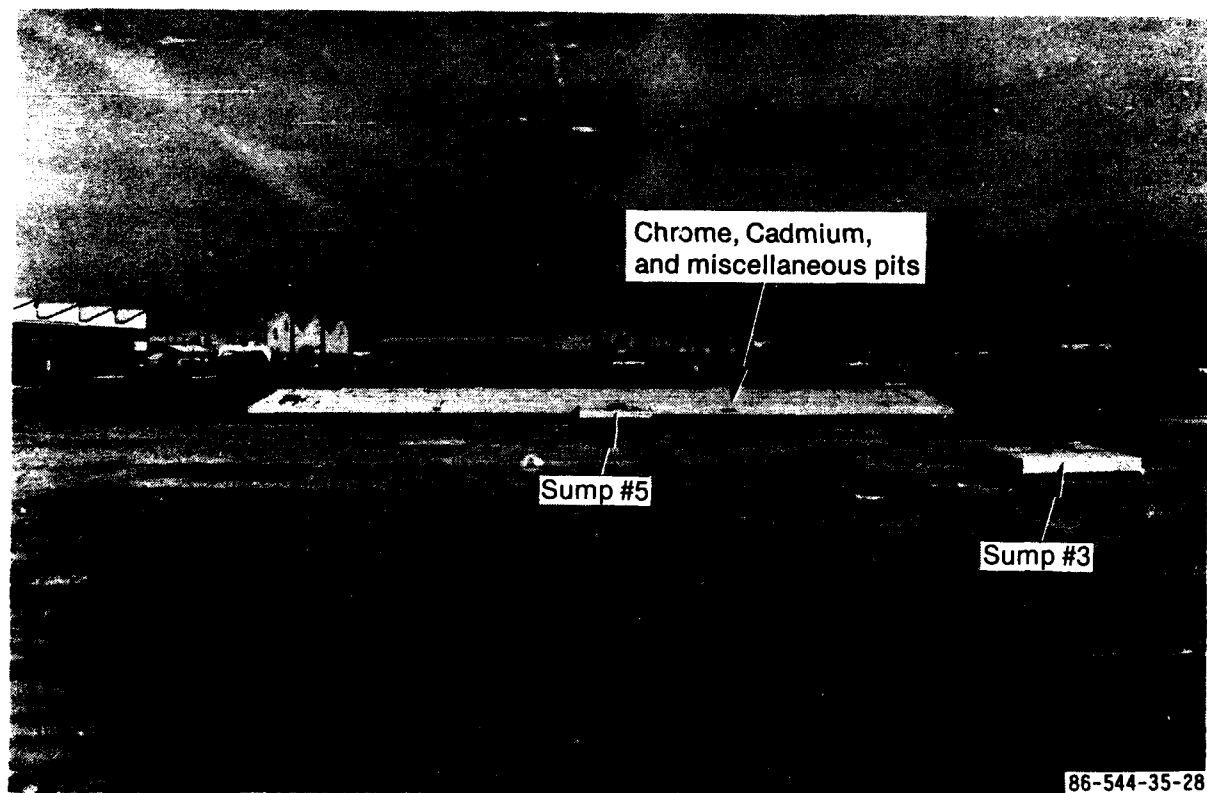


Figure 76. Site 47 looking northwest showing roof structures above some of the sumps and pits.

TABLE 7. DEPTHS OF SUMPS, PITS, AND UNDERGROUND RESERVOIRS AT  
SITES 47 AND 48

Designation of Figure 74	Original Use	Approximate Depth (ft) <sup>a</sup>
Sump #1	Unknown (located in small item sandblast room)	2.5
Sump #2	Unknown	8
Sump #3	Lead and lead-indium plating	6.5
Sump #4	Steam	8 <sup>b</sup>
Sump #5	Copper and tin plating	6.5
Sandblast Facility pit	Sand	14
Manway to Sandblast Facility pit	Sand	14
Two underground reservoirs	Plant water	7
Cadmium pit	Cadmium plating	5
Cadmium pit sump	Cadmium plating	11.5
Degreaser pit	Degreasing	12
Chrome pit	Chrome plating	5
Chrome pit sump	Chrome plating	13.5
Miscellaneous pit	Probably degreasing	5
Miscellaneous pit sump	Probably degreasing	6.5
Sump #6	Miscellaneous waste (silver buildup area)	6
Sump #7	Waste cyanide	5
Sump #8	Miscellaneous waste (rough cleaning and pickling area)	7
Sump #9	Waste cyanide	7
Sump #10	Sump for reduction tank 522	3
Valve pit	Associated with coagulator tank 525	6.5
Sludge sump	Associated with coagulator tank 525	5

a. Depths are from surface concrete slab.

b. This depth is to the bottom of the deepest part of sump.

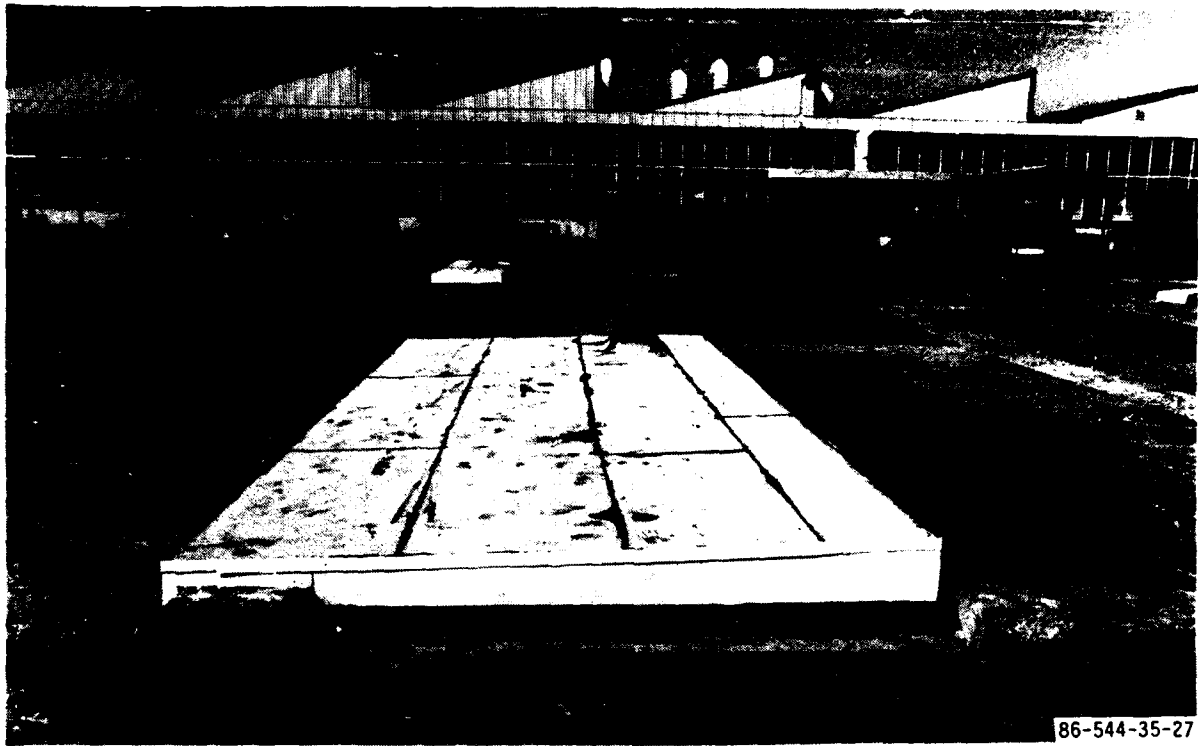


Figure 77. Degreaser pit roof structure looking west.

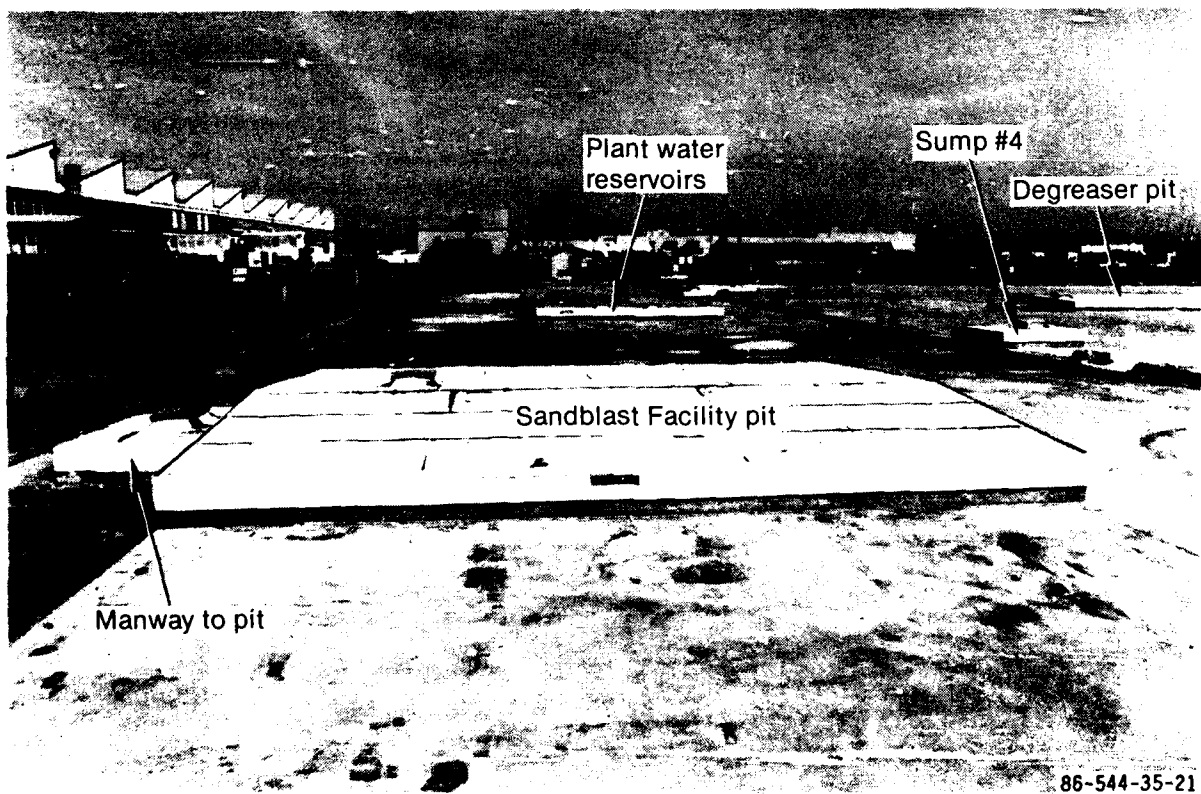


Figure 78. Roof structure above Sandblast Facility pit and manway.

### Site 48

Site 48 consists of the original concrete slab of the IWTP No. 4 with all slab penetrations filled with concrete and covers constructed over the sumps, pits, and entrances to the two underground plant water reservoirs. Figure 79 is a photograph of the south section of Site 48 looking south, and Figure 80 shows the north section looking north. There is an inspection port on each roof structure for future monitoring.



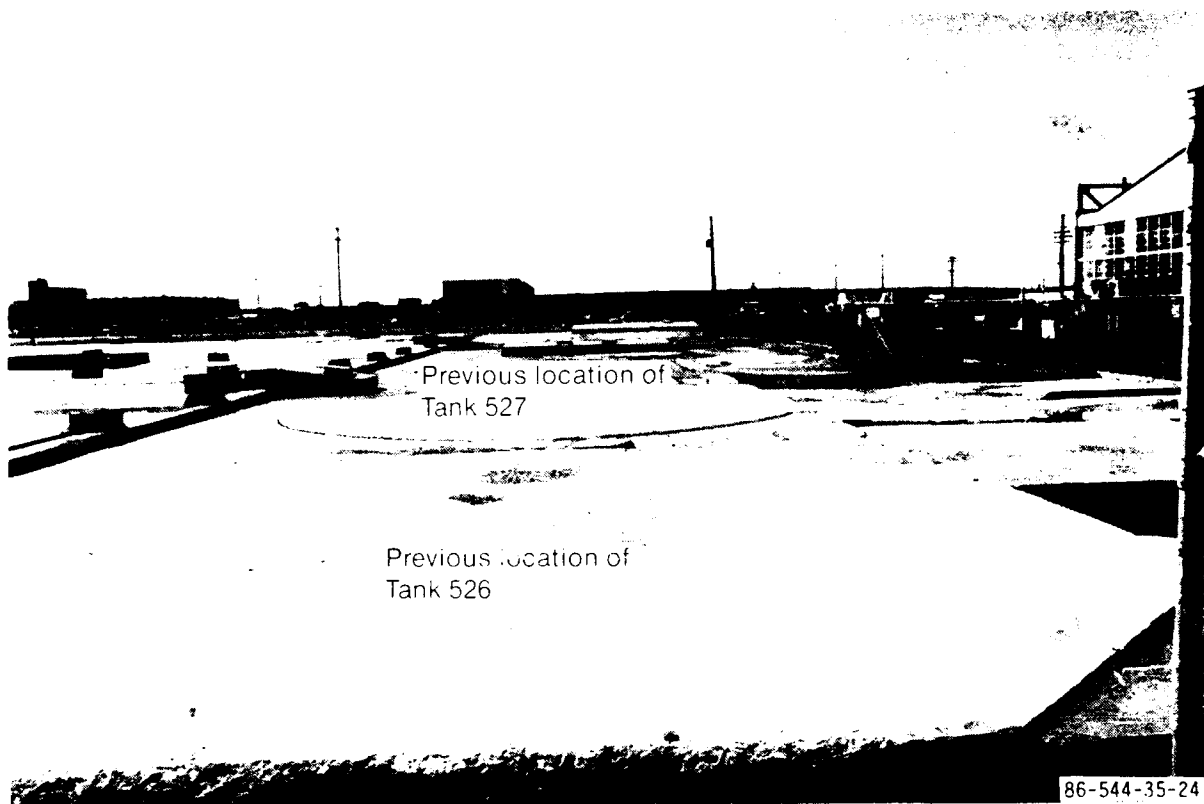


Figure 79. South section of Site 48 looking south.

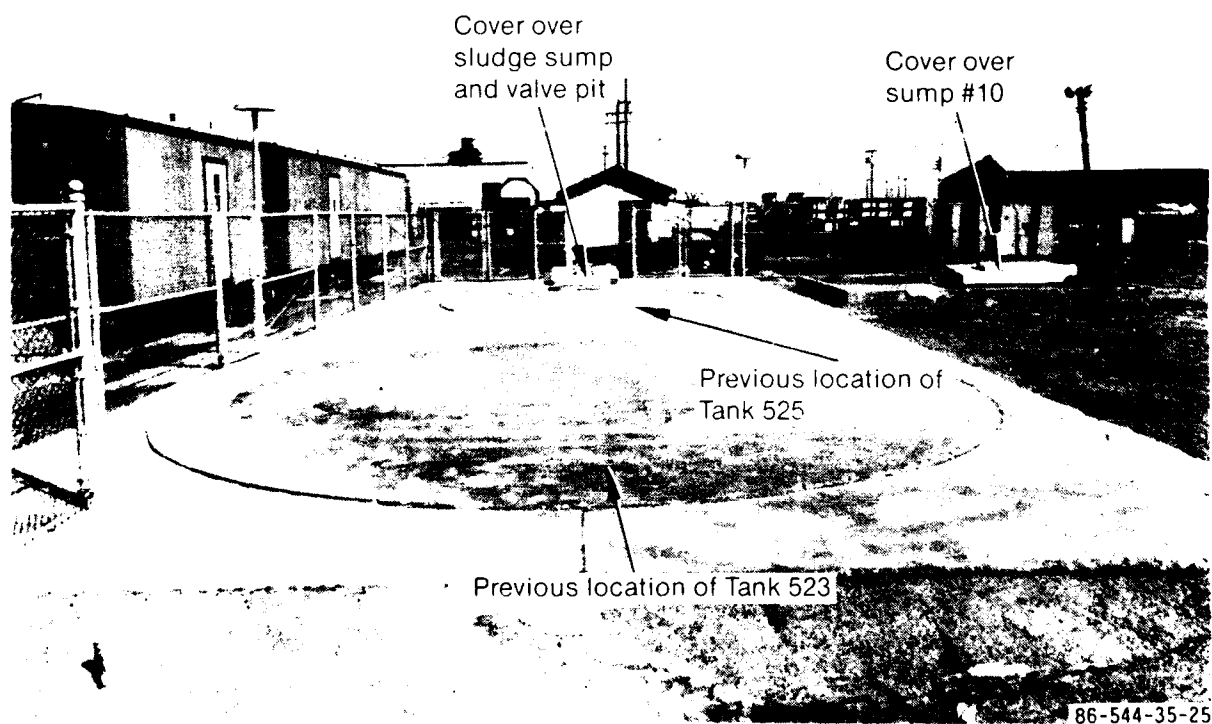


Figure 80. North section of Site 48 looking north.

## REFERENCES

1. Thomas J. Walker, Inc., Decontamination Plan to Close Hazardous Waste Facility--Building 666--at McClellan AFB, January 1983.
2. McLaren Environmental Engineering, Contamination in Area B, McClellan Air Force Base, April 1986.
3. EG&G Idaho, Inc., Statement of Work for Dismantlement of Building 666 (Site 47) and Industrial Wastewater Treatment Plant No. 4 (Site 48).